TOSHIBA
Leading Innovation

UM-V200-E001

Programmable Logic Controllers

USER'S MANUAL
Setup & Operation

CONTENTS

V200 Series PLC

Toshiba International Corporation

Thank you for purchasing the V200 Series PLC (Programmable Logic Controller) product from Toshiba International Corp. V200 Series products are versatile PLCs which are configured with Microsoft Windows® based software.

Manual's Purpose and Scope

This manual provides information on how to safely install, operate, and maintain your TIC V200 Series PLC. This manual includes a section of general safety instructions that describes the warning labels and symbols that are used throughout the manual. Read the manual completely before installing, operating, or performing maintenance on this equipment.

This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review. Dimensions shown in the manual are in metric and/or the English equivalent.

Toshiba International Corporation reserves the right, without prior notice, to update information, make product changes, or to discontinue any product or service identified in this publication.

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Toshiba International Corporation (TIC) shall not be liable for technical or editorial omissions or mistakes in this manual, nor shall it be liable for incidental or consequential damages resulting from the use of information contained in this manual.

Printed in the U.S.A.

Important Notice

The instructions contained in this manual are not intended to cover all details or variations in equipment types, nor may it provide for every possible contingency concerning the installation, operation, or maintenance of this equipment. Should additional information be required contact your Toshiba representative.

The contents of this manual shall not become a part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of Toshiba International Corporation. The warranty contained in the contract between the parties is the sole warranty of Toshiba International Corporation and any statements contained herein do not create new warranties or modify the existing warranty.

Any electrical or mechanical modifications to this equipment without prior written consent of Toshiba International Corporation will void all warranties and may void the 3rd party (CE, UL, CSA, etc) safety certifications. Unauthorized modifications may also result in a safety hazard or equipment damage.

Contacting Toshiba's Customer Support Center

Toshiba's Customer Support Center may be contacted to obtain help in resolving any system problems that you may experience or to provide application information.

The center is open from 8 a.m. to 5 p.m. (CST), Monday through Friday. The Support Center's toll free number is US 800-231-1412 Fax 713-466-8773 — Canada 800-527-1204 — Mexico 01-800-527-1204.

You may also contact Toshiba by writing to:

Toshiba International Corporation
13131 West Little York Road
Houston, Texas 77041-9990
Attn: PLC Marketing
Or email
plc@tic.toshiba.com.

For further information on Toshiba's products and services, please visit our website at **www.toshiba.com/ind/**.

Manual Revisions

Please have the following information available when contacting Toshiba International Corp. about this manual.

Name: V200 User's Manual
Document: UM-V200-E001
Revision:

Rev No.	Date	Description
0	2012/01/1	Initial Issue (for V200)

Table of Contents

GENERAL SAFETY INSTRUCTIONS & INFORMATION

0.1 Warning Labels Within Manual

DO NOT attempt to install, operate, maintain, or dispose of this equipment until you have read and understood all of the product warnings and user directions that are contained in this instruction manual.

Listed below are the signal words that are used throughout this manual followed by their descriptions and associated symbols. When the words **DANGER**, **WARNING**, and **CAUTION** are used in the manual, they will be followed by important safety information that must be carefully adhered to.

DANGER — The danger symbol is an exclamation mark enclosed in a triangle that precedes the word DANGER. The danger symbol is used to indicate an imminently hazardous situation that will result in serious injury, possible severe property and equipment damage, or death if the instructions are not followed.

WARNING — The warning symbol is an exclamation mark enclosed in a triangle that precedes the word WARNING. The warning symbol is used to indicate a potentially hazardous situation that can result in serious injury, or possibly severe property and equipment damage, or death, if the instructions are not followed.

CAUTION — The caution symbol is an exclamation mark enclosed in a triangle that precedes the word CAUTION. The caution symbol is used to indicate situations that can result in minor or moderate operator injury, or equipment damage if the instructions are not followed.

To identify special hazards, other symbols may appear in conjunction with the **DANGER**, **WARNING**, and **CAUTION** symbols. These warnings describe areas that require special care and/or strict adherence to the procedures to prevent serious injury and possible death.

Electrical Hazard — The electrical hazard symbol is a lightning bolt enclosed in a triangle. The electrical hazard symbol is used to indicate high voltage locations and conditions that may cause serious injury or death if the proper precautions are not observed.

Explosion Hazard — The explosion hazard symbol is an explosion image enclosed in a triangle. The explosion hazard symbol is used to indicate locations and conditions where molten exploding parts may cause serious injury or death if the proper precautions are not observed.

0.2 Equipment Warning Labels.

DO NOT attempt to install, operate, maintain, or dispose of this equipment until you have read and understood all of the product warnings and user directions that are contained in this instruction manual.

Shown below are examples of warning labels that may be found attached to the equipment. **DO NOT** remove or cover any of the labels. If the labels are damaged or if additional labels are required, contact your Toshiba representative for additional labels.

The following are examples of the warning labels that may be found on the equipment and are there to provide useful information or to indicate an imminently hazardous situation that may result in serious injury, severe property and equipment damage, or death if the instructions are not followed.

Examples of labels that may be found on the equipment.

0.3 Preparation

Qualified Person

A **Qualified Person** is one that has the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and has received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

Qualified Personnel shall:

- Have carefully read the entire operation manual.
- Be trained and authorized to safely energize, de-energize, ground, lockout and tag circuits and equipment, and clear faults in accordance with established safety practices.
- Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.
- Be trained in rendering first aid.

For further information on workplace safety visit www.osha.gov.

Equipment Inspection

- Upon receipt of the equipment inspect the packaging and equipment for shipping damage.
- Carefully unpack the equipment and check for parts that were damaged from shipping, missing parts, or concealed damage. If any discrepancies are discovered, it should be noted with the carrier prior to accepting the shipment, if possible. File a claim with the carrier if necessary and immediately notify your Toshiba representative.
- **DO NOT** install or energize equipment that has been damaged. Damaged equipment may fail during operation resulting in further equipment damage or personal injury.
- Check to see that the model number specified on the nameplate conforms to the order specifications.
- Modification of this equipment is dangerous and must not be performed except by factory trained representatives. When modifications are required contact your Toshiba representative.
- Inspections may be required before and after moving installed equipment.
- Keep the equipment in an upright position as indicated on the shipping carton.
- Contact your Toshiba representative for assistance if required.

Handling and Storage

- Use proper lifting techniques when moving the V200; including properly sizing up the load, and getting assistance if required.
- Store in a well-ventilated covered location and preferably in the original carton if the equipment will not be used upon receipt.
- Store in a cool, clean, and dry location. Avoid storage locations with extreme temperatures, rapid temperature changes, high humidity, moisture, dust, corrosive gases, or metal particles.
- Do not store the unit in places that are exposed to outside weather conditions (i.e., wind, rain, snow, etc.).
- Store in an upright position as indicated on the shipping carton.
- Include any other product-specific requirements.

Disposal

Never dispose of electrical components via incineration. Contact your state environmental agency for details on disposal of electrical components and packaging in your area.

0.4 Installation Precautions

Location and Ambient Requirements

- Adequate personnel working space and adequate illumination must be provided for adjustment, inspection, and maintenance of the equipment (refer to NEC Article 110-34).
- Avoid installation in areas where vibration, heat, humidity, dust, fibers, steel particles, explosive/corrosive mists or gases, or sources of electrical noise are present.
- The installation location shall not be exposed to direct sunlight.
- Allow proper clearance spaces for installation. Do not obstruct the ventilation openings. Refer to the recommended minimum installation dimensions as shown on the enclosure outline drawings.
- The ambient operating temperature shall be between 0° and 50° C (32° and 122° F).

Mounting Requirements

- Only **Qualified Personnel** should install this equipment.
- Install the unit in a secure upright position in a well-ventilated area.
- A noncombustible insulating floor or mat should be provided in the area immediately surrounding the electrical system at the place where maintenance operations are to be performed.

- As a minimum, the installation of the equipment should conform to the NEC Article 110 Requirements For Electrical Installations, OSHA, as well as any other applicable national, regional, or industry codes and standards.
- Installation practices should conform to the latest revision of NFPA 70E Electrical Safety Requirements for Employee Workplaces.

Conductor Routing and Grounding

- Use separate metal conduits for routing the input power, and control circuits.
- A separate ground cable should be run inside the conduit with the input power, and control circuits.
- **DO NOT** connect control terminal strip return marked CC to earth ground.
- Always ground the unit to prevent electrical shock and to help reduce electrical noise.

The Metal Of Conduit Is Not An Acceptable Ground.

0.5 Connection, Protection & Setup

Personnel Protection

- Installation, operation, and maintenance shall be performed by **Qualified Personnel <u>Only</u>**.
- A thorough understanding of the V200 will be required before the installation, operation, or maintenance of the V200.
- Rotating machinery and live conductors can be hazardous and shall not come into contact with humans. Personnel should be protected from all rotating machinery and electrical hazards at all times. Depending on its program, the V200 can initiate the start and stop of rotating machinery.
- Insulators, machine guards, and electrical safeguards may fail or be defeated by the purposeful or inadvertent actions of workers. Insulators, machine guards, and electrical safeguards are to be inspected (and tested where possible) at installation and periodically after installation for potential hazardous conditions.
- Do not allow personnel near rotating machinery. Warning signs to this effect shall be posted at or near the machinery.
- Do not allow personnel near electrical conductors. Human contact with electrical conductors can be fatal. Warning signs to this effect shall be posted at or near the hazard.
- Personal protection equipment shall be provided and used to protect employees from any hazards inherent to system operation or maintenance.

System Setup Requirements

- When using the V200 as an integral part of a larger system, it is the responsibility of the V200 installer or maintenance personnel to ensure that there is a fail-safe in place (i.e., an arrangement designed to switch the system to a safe condition if there is a fault or failure).
- System safety features should be employed and designed into the integrated system in a manner such that system operation, even in the event of system failure, will not cause harm or result in personnel injury or system damage (i.e., E-Off, Auto-Restart settings, System Interlocks, etc.).
- The programming setup and system configuration of the V200 may allow it to start a motor unexpectedly. A familiarity with Auto-restart settings is a requirement to use this product.
- Improperly designed or improperly installed system interlocks may render the motor unable to start or stop on command.

The failure of external or ancillary components may cause intermittent system operation, i.e., the system may start a motor without warning or may not stop on command.

- There may be thermal or physical properties, or ancillary devices integrated into the overall system that may allow the V200 to start a motor without warning. Signs at the equipment installation must be posted to this effect.
- The operating controls and system status indicators should be clearly readable and positioned where the operator can see them without obstruction.
- Additional warnings and notifications shall be posted at the equipment installation location as deemed required by **Qualified Personnel**.

0.6 System Integration Precautions

The following precautions are provided as general guidelines for using an V200 in an industrial or process control system.

- The Toshiba PLC is a general-purpose product. It is a system component and is used in conjunction with other items of industrial equipment such as PLCs, Loop Controllers, Adjustable Speed Drives, etc.
- **A detailed system analysis and job safety analysis should be performed by the systems designer or systems integrator before including the V200 in any new or existing system**. Contact Toshiba for options availability and for application-specific system integration information if required.
- The PLC may be used to control an adjustable speed drive connected to high voltage sources and rotating machinery that is inherently dangerous if not operated safely. Interlock all energy sources, hazardous locations, and guards in order to restrict the exposure of personnel to hazards. The adjustable speed drive may start the motor without warning. Signs at the equipment installation must be posted to this effect. A familiarity with Auto-restart settings is a requirement when controlling adjustable speed drives. Failure of external or ancillary components may cause intermittent system operation, i.e., the system may start the motor without warning or may not stop on command. **Improperly designed or improperly installed system interlocks and permissives may render a motor unable to start or stop on command**
- Control through serial communications can fail or can also override local controls, which can create an unsafe condition. System safety features should be employed and designed into the integrated system in a manner such that system operation, even in the event of system failure, will not cause harm or result in personnel injury or system damage. Use of the built-in system protective features and interlocks of the equipment being controlled is highly recommended (i.e., emergency-off, overload protection, etc.)
- **Never use the PLC units to perform emergency stops**. Separate switches outside the V200, the PLC, and the ASD should be used for emergency stops.
- Changes or modifications to the PLC program should not be made without the approval of the system designer or systems integrator. Minor changes or modifications could cause the defeat of safety interlocks and permissives. Any changes or modifications should be noted and included with the system documentation.

0.7 3rd Party Safety Certifications.

CE Marking

The V200 Series Programmable Controllers conform to the directive and standards of ISO/IEC Guide 22 and EN 45014.

Conforms to the following Product Specifications

EMI(Electro Magnetic Interference)	:	
Conducted*/Radiated	:	EN61131-2:2007/EN55011
EMS(Electro Magnetic Susceptibility)	:	
ESD	:	EN61131-2:2007/EN61000-4-2
RF EM field	:	EN61131-2:2007/EN61000-4-3
Fast Transient	:	EN61131-2:2007/EN61000-4-4
Surge Immunity	:	EN61131-2:2007/EN61000-4-5
Conducted Disturbances	:	EN61131-2:2007/EN61000-4-6
Magnetic Field Immunity **	:	EN61131-2:2007/EN61000-4-8
Voltage dips & Interruptions*	:	EN61131-2:2007/EN61000-4-11
Electrical Safety	:	EN61131-2: 2007

UL Certification

The UL Mark on a product means that UL has tested and evaluated representative samples of that product and determined that they meet UL requirements. The basic standards used to investigate this category are UL 508, the Standard of Safety for Industrial Control Equipment and UL Standard for Safety for Programmable Controllers. V200 Programmable Logic Controllers are certified NRAG &NRAG7 for use in hazardous locations

ONLINE CERTIFICATIONS DIRECTORY

Home Quick Guide Contact Us UL.com

Search results

You may choose to Refine Your Search.

Company Name	Category Name	Link to File
TOSHIBA CORP	Programmable Controllers for Use in Hazardous Locations	NRAG.E184034
TOSHIBA CORP	Programmable Controllers for Use in Hazardous Locations Certified for Canada	NRAG7.E184034

RoHS Product Certification

The V200 Series PLCs meet the European Directive on the Restriction of Hazardous Substances (RoHS) in electrical and electronic equipment companies This insures the chemical compliance of the V200.

INTRODUCTION

1.1 Purpose of this Manual

Thank you for purchasing V200 Series Products from TIC Houston. V200 Series Products are versatile high-performance programmable controllers with Microsoft® Windows based configuration Software.

This Manual explains the operation of the V200 Series and how to implement available features using the OIL-DS Software. This manual will help you to install, configure and operate your V200 product.

1.1.1 V200 Basics

The V200 provides much more versatility than traditional programmable controllers. It supports basic relay ladder functions. In addition to this it provides functions such as data operations, arithmetic operations, various functions etc. Furthermore, its high speed counter functions, pulse output functions, and data communication functions allow its application to a wide scope of control systems.

What is a *Project*?

A project is an user created application in OIL-DS Software. A project contains information such as the V200 model, Network Configuration, ladder information, etc.

What is a *Ladder*?

You use Ladder Logic to write your project application. Ladder is based on Boolean principals. Ladder Diagrams are composed of different types of contact, coil and function block elements. These elements are placed in nets.

In any Ladder Diagram, the contacts represent input conditions. They lead power from the left rail to the right rail. Coils represent output instructions. In order for output coils to be activated, the logical state of the contacts must allow the power to flow through the net to the coil.

1.1.2 Programming Computer

The following basic PC hardware configuration is needed to configure and operate your OIL-DS Configuration Software.
Minimal PC configuration for Windows2000 / XP:

DEVICE	RECOMMENDED
Processor	800MHz Pentium processor OR euivalent processor
Operating System	Microsoft Windows 2000 with SP4 Microsoft Windows XP Professional / Home Edition with SP2
RAM	256MB
Hard Disk Space	800MB (including 200MB for the .NET Framework Redistributable)
Display	1024 x 768 High Color 16-bit
Mouse/Keyboard	Required

Minimal PC configuration for Vista:

DEVICE	RECOMMENDED
Processor	1GHz Pentium processor or equivalent processor
Operating System	Microsoft Windows Vista Home and Vista Business edition
RAM	1GB
Hard Disk Space	800MB (including 200MB for the .NET Framework Redistributable)
Display	1024 x 768 High Color 16-bit
Mouse/Keyboard	Required

These are the minimum system requirements for a computer running the OIL-DS Configuration software.

1.2 V200 Features

Expansion Models:

The following are the digital expansion models:
-> 16 points DC input
-> 16 points DC output (NPN Type)
-> 16 points DC output (PNP Type)
-> 16 points DC output (Relay Type)
-> 8 DC inputs + 8 DC outputs (NPN type)
-> 8 DC inputs + 8 DC outputs (PNP type)
-> 8 DC inputs + 8 DC outputs (Relay type)
The following are the analog expansion models:
-> 4 Universal Analog inputs & 2 analog outputs (V-I Type)
-> 8 Analog inputs (Linear Type)
-> 8 Analog inputs (RTD Type)
-> 4 Analog outputs (V-I Type)

Built-in high speed counter:

Two single-phase or one quadrature (2-phase) pulses can be counted. In single phase mode, up to 50KHz and in quadrature mode, up to 5KHz frequency can be counted.

High speed processing:

Sophisticated machine control applications require high speed data manipulations. The V200 is designed to meet these requirements.
· 1.4 ms per contact · 2.3 ms per coil
· 4.2 ms per 16-bit transfer · 6.5 ms per 16-bit addition
The V200 also supports interrupt input function (DC input type only). This allows immediate operation independent of program scan.

High performance software:

The V200s offer various basic ladder instructions and other functional instructions. Subroutines, Interrupt functions, Indirect addressing, For/Next loops, Pre-derivative real PID, etc. are standard on the V200. These functions allow the unit to be applied to the most demanding control applications.

Pulse output / PWM output:

One point of variable frequency pulses (max. 5 kHz) or variable duty pulses can be output. These functions can be used to drive a stepping motor or to simulate an analog output. (DC input type only)

Removable terminal blocks:

The V200 is equipped with removable terminal blocks. This supports the easy maintenance work.

Real-time clock/calendar function:

The V200 has the real-time-clock/calendar function (year, month, day, day of the week, hours, minutes, seconds) that can be used for performing scheduled operations, data gathering with time stamps, etc. The real-time-clock/calendar data is backed up by a removable and replaceable battery.

RS-485 multi-purpose communication port:

The V200 CPU has an RS-485 multi-purpose communication port. Using this port, one of the following communication modes can be selected.
Computer link mode: T-series computer link protocol can be used in this mode. Up to 32 V200s can be connected to a master computer. By using this mode, MMI/SCADA system can be easily configured.
Data link mode: Two PLCs can be directly linked together. This direct link is inexpensive, easily configured and requires no special programming.
Free ASCII mode: User defined ASCII messages can be transmitted and received through this port. A terminal, printer, bar-code reader, or other serial ASCII device can be directly connected.

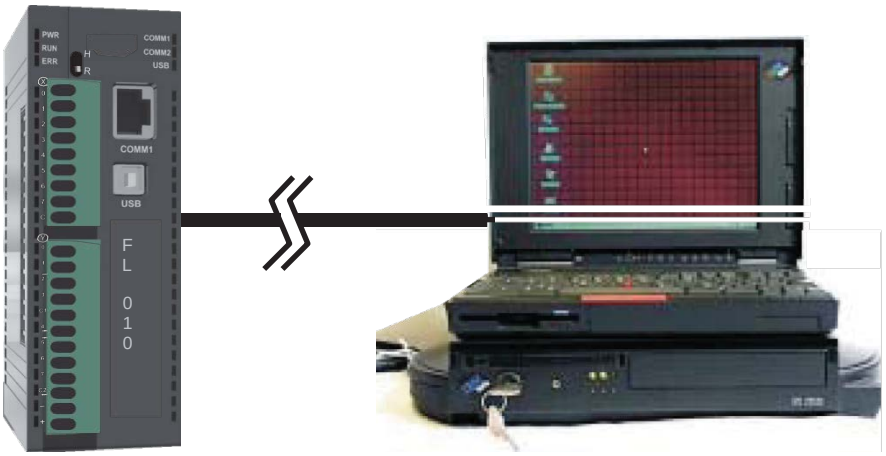
1.3 V200 Overview

1.3.1 What is a V200 Series Controller

V200 Series units are compact, easy-handling block style programmable controller. It also has modular expandability.

Configuration of V200 unit:

Each V200 CPU has to be configured using the OIL-DS Software before connecting it to the system.



Normal Operation:

The V200 family is designed to offer practical PLC features in a compact and expandable design, and at the same time offer a simple-to-use philosophy. An external powered V200 Series base model by itself can be used as a complete PLC system with optional built-in I/O points, or the system can be expanded with the addition of up to eight I/O modules.

The V200 can be mounted in DIN rail plate. The base CPU and I/O modules are connected together via an expansion port on the sides of the modules. A variety of I/O modules are available for flexible and optimal system configuration.

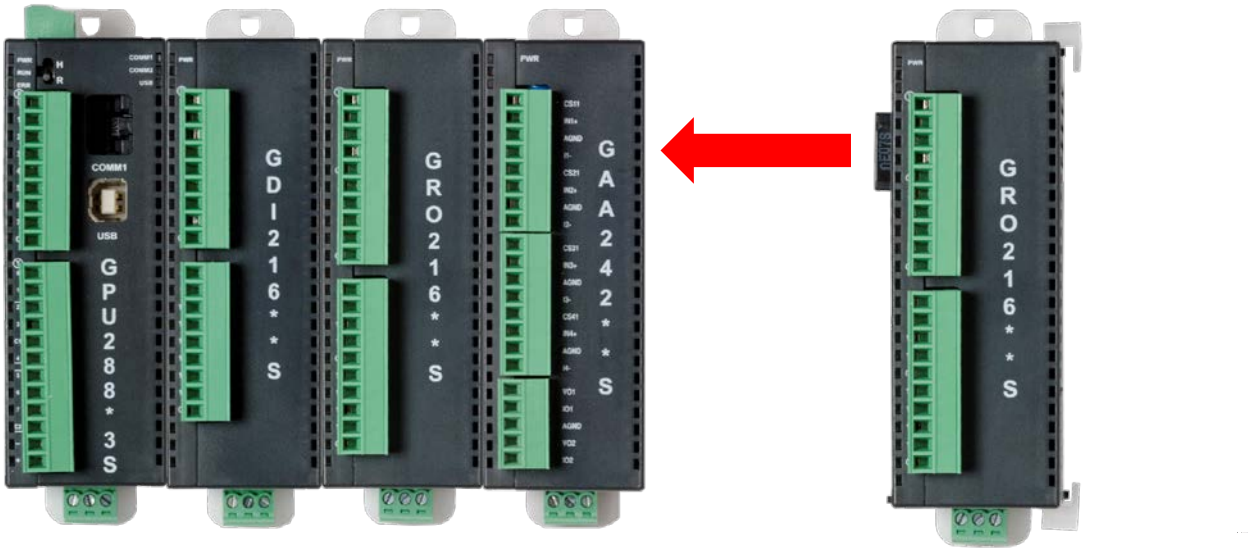
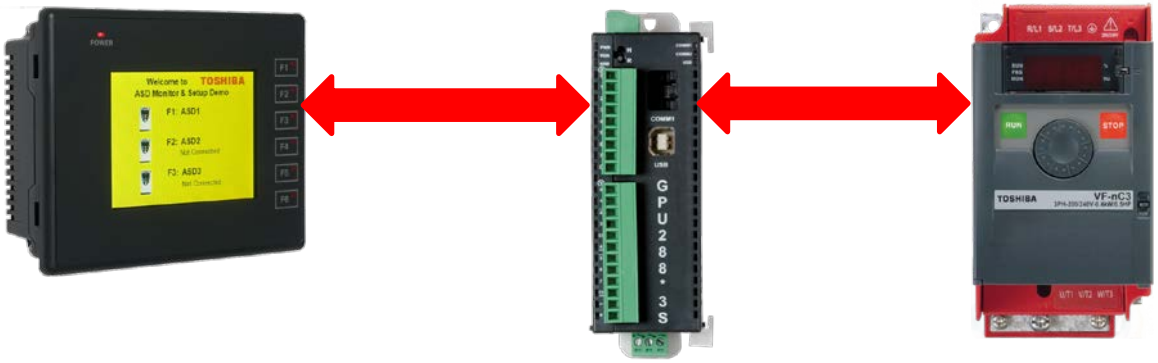


FIG-1: V200 Base with Expansions Modules

Application Examples1:

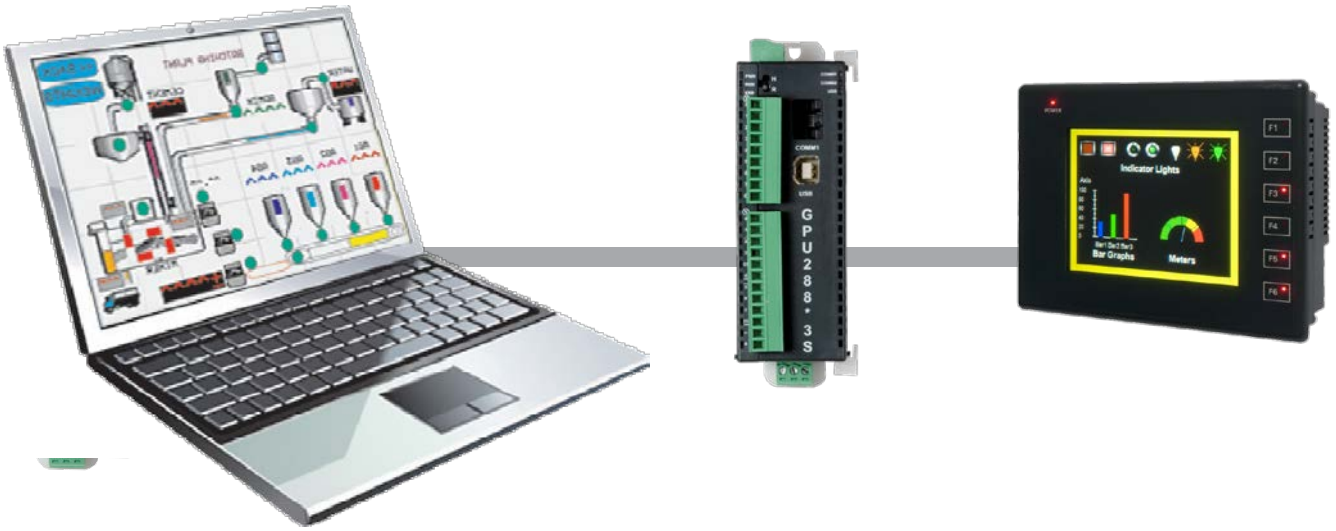
OIS V200 PLC ASD



As shown above, V200 base unit can be connected to OIS as well as to ASD. Thus it can worked with two different protocols at a time.

Application Examples2:

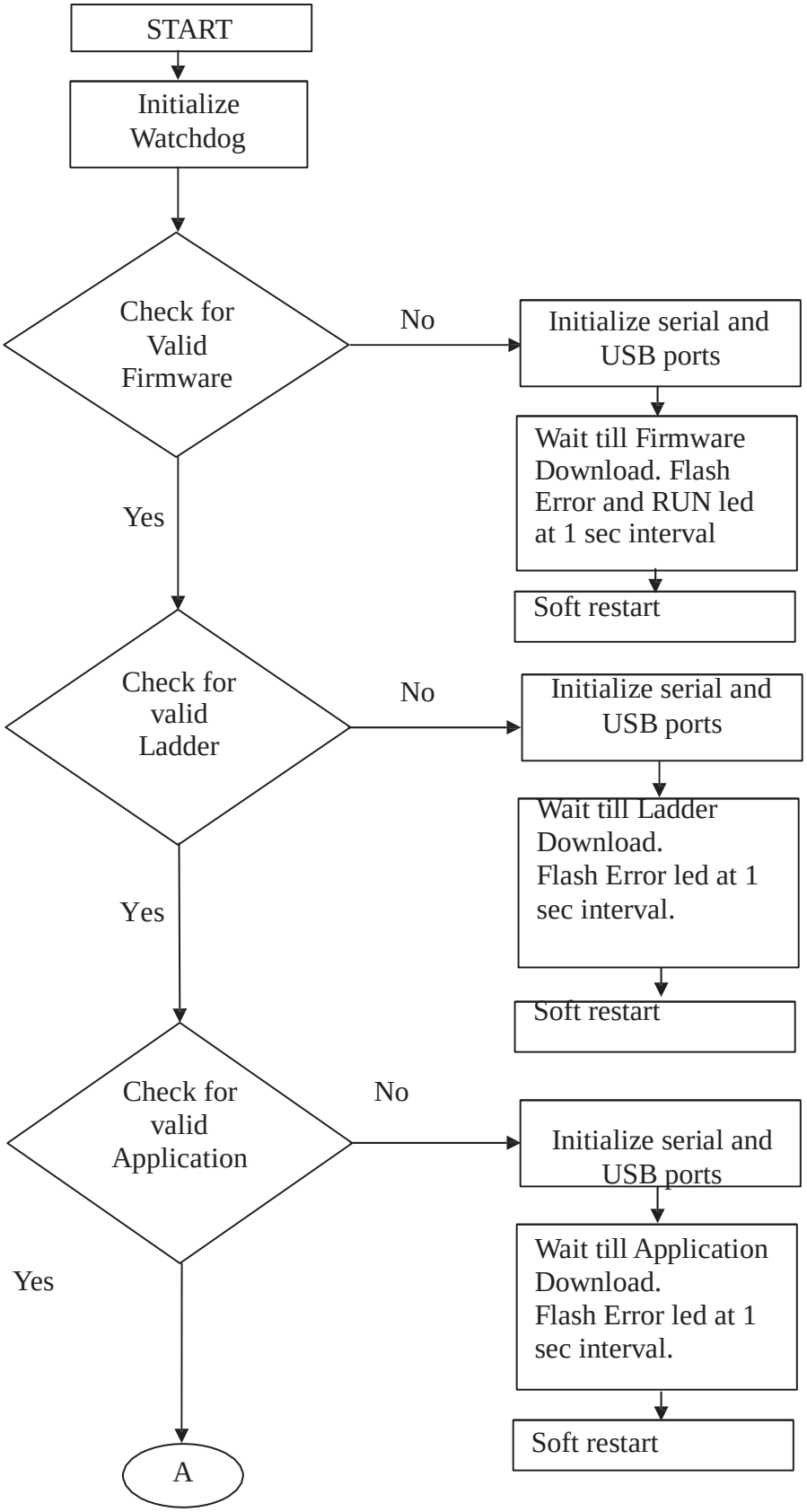
SCADA PLC OIS

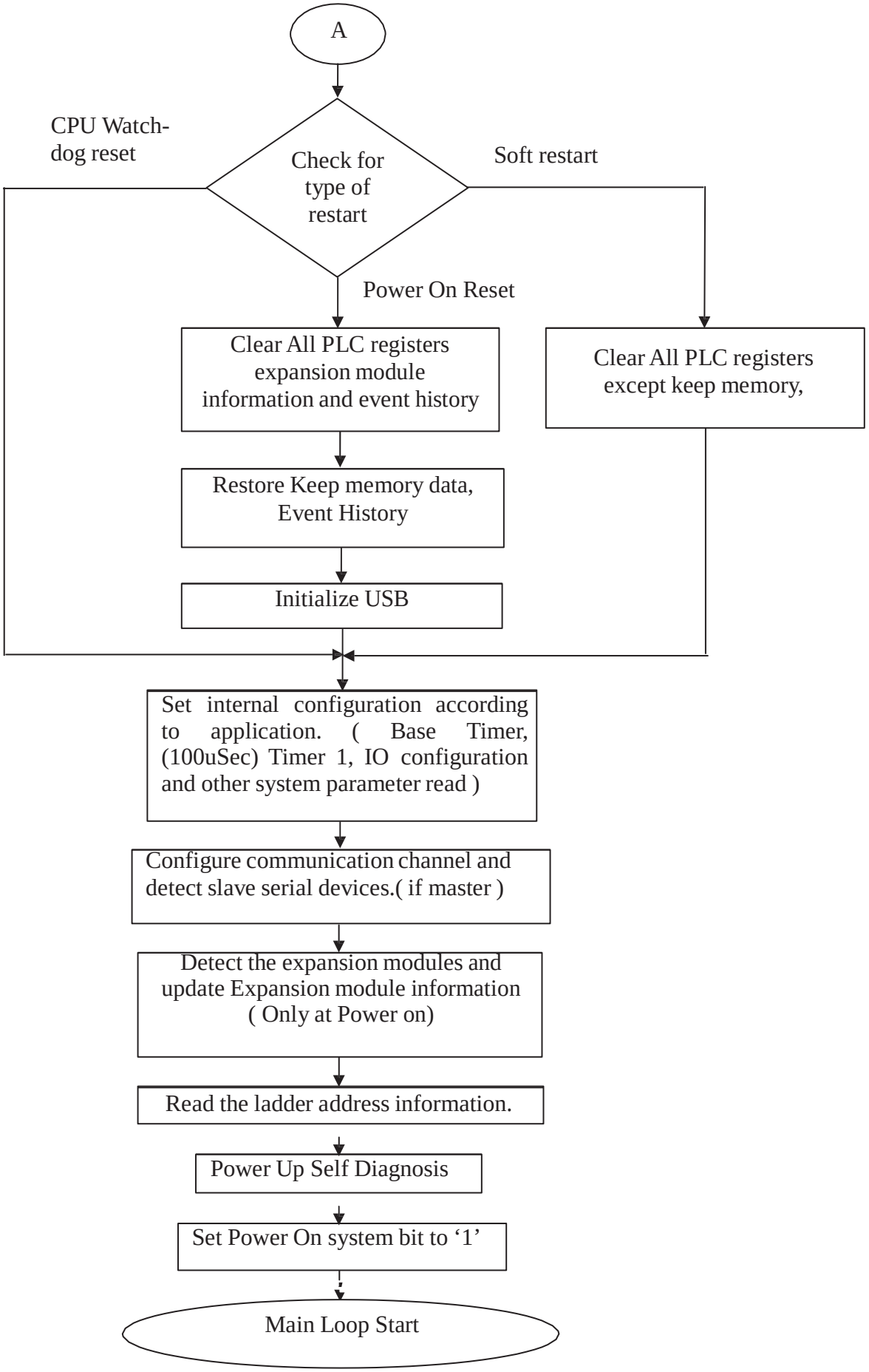


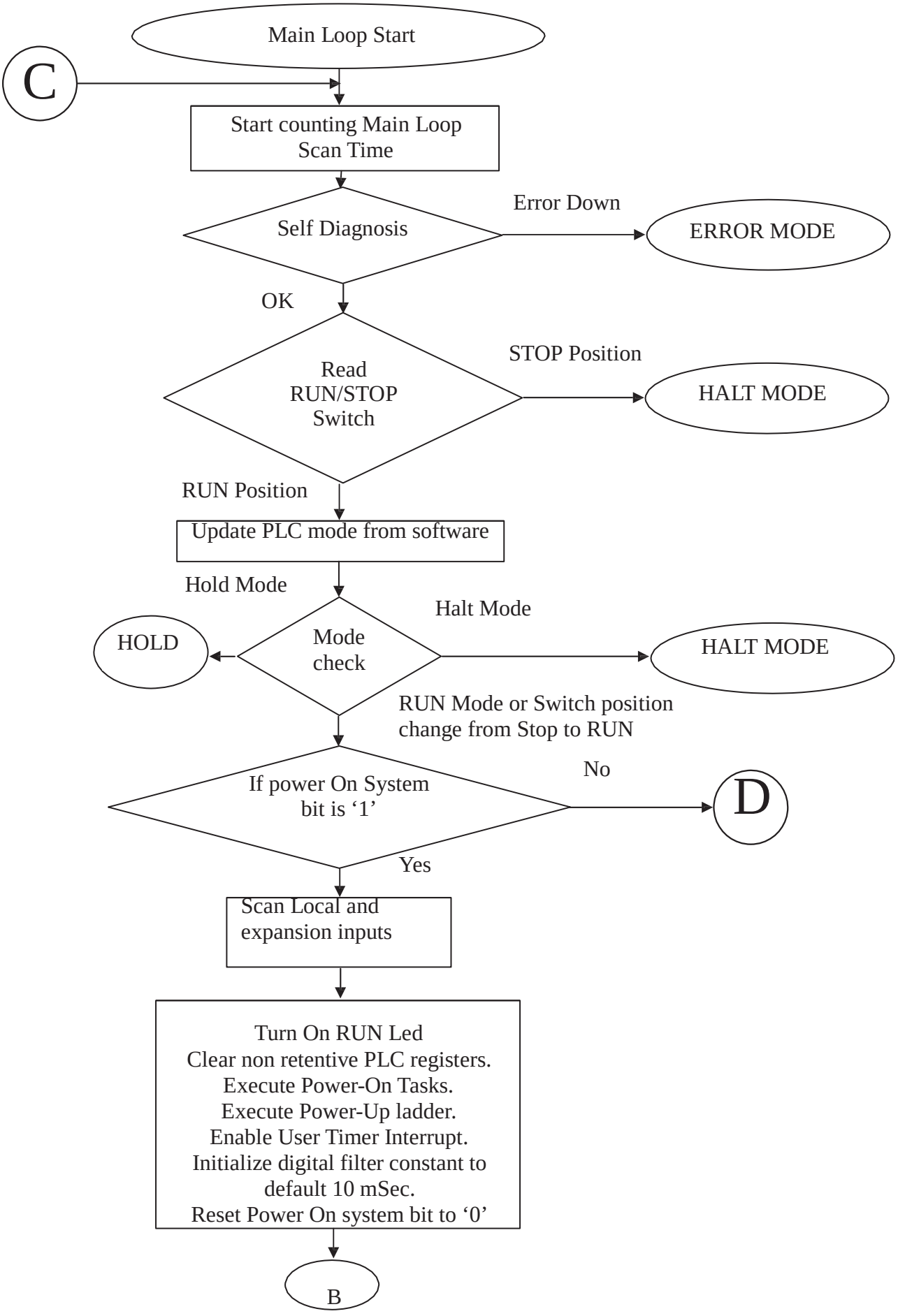
As shown above, V200 base unit can be connected to SCADA as well as OIS.

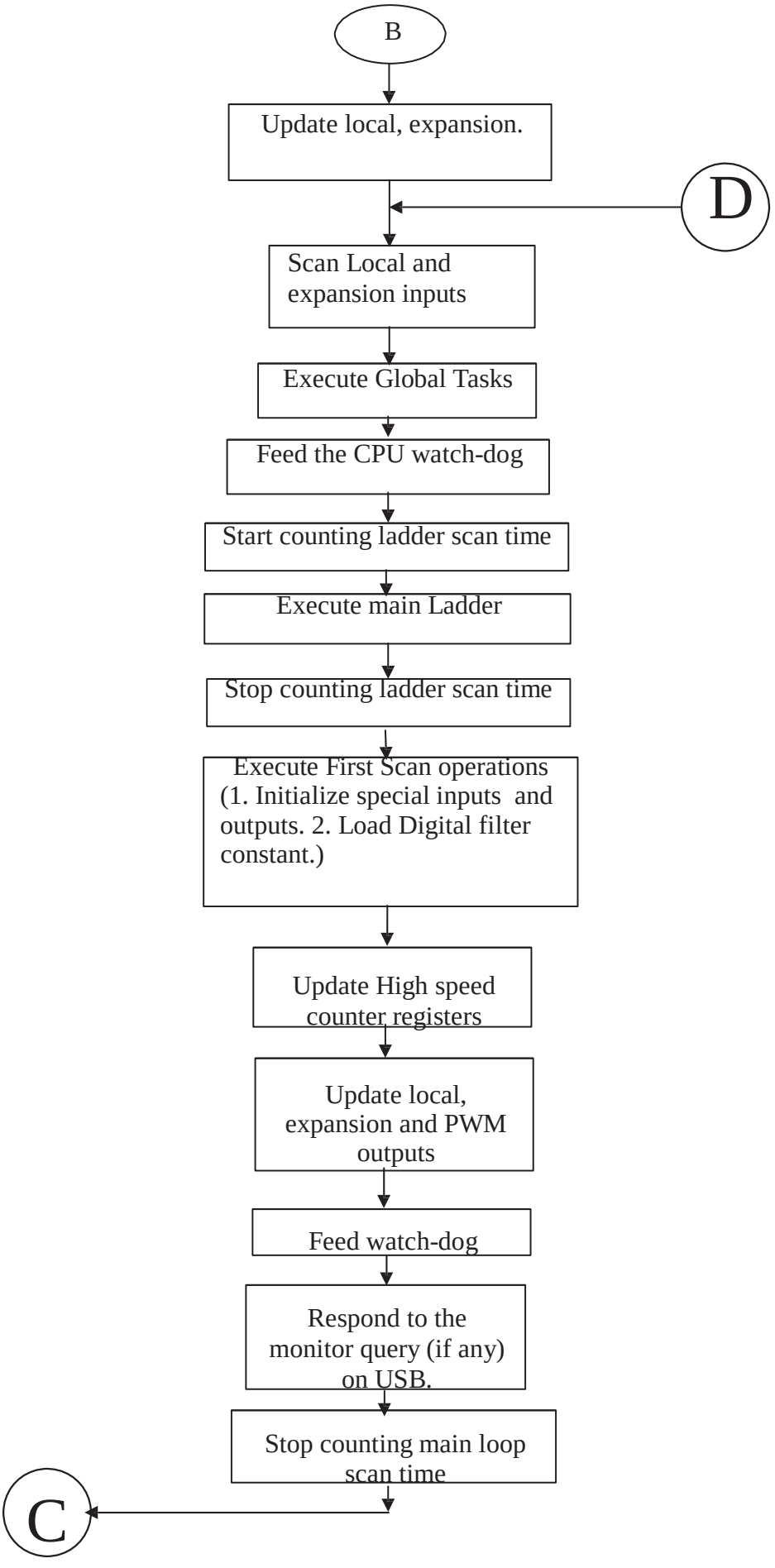
1.3.2 How V200 Works

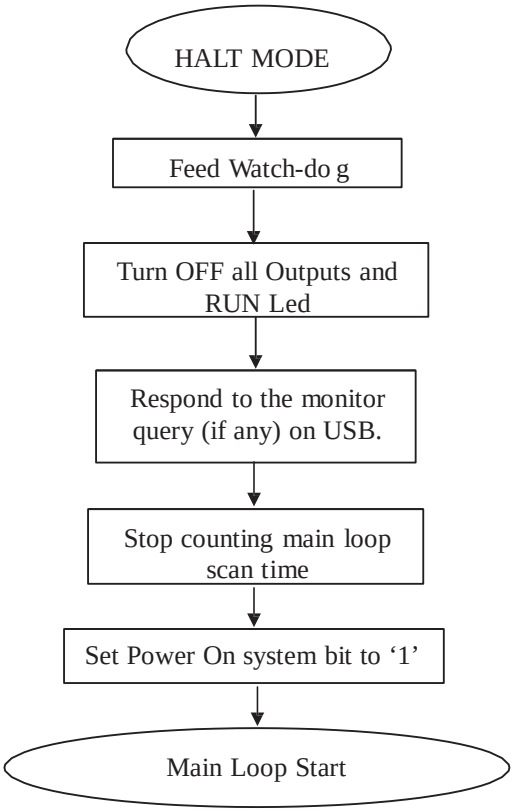
The V200 follows a specific sequence and the sequence is as shown below:

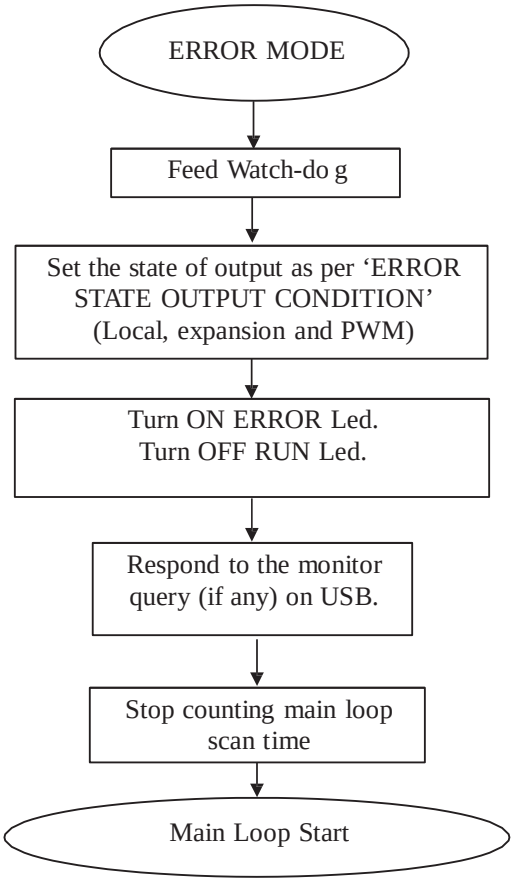


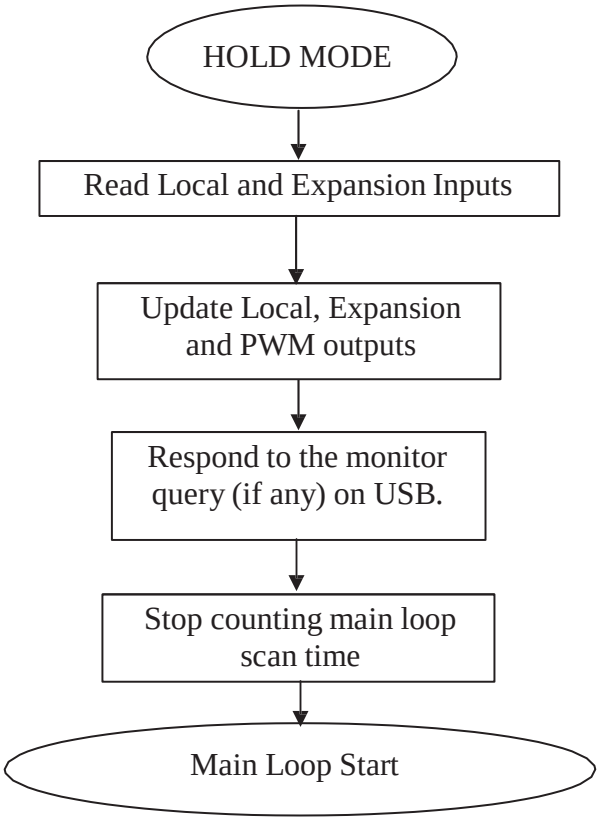

A
CPU Watch-dog reset
Check for type of restart
Soft restart
Power On Reset
Clear All PLC registers expansion module information and event history
Clear All PLC registers except keep memory,
Restore Keep memory data, Event History
Initialize USB
Set internal configuration according to application. (Base Timer, (100uSec) Timer 1, IO configuration and other system parameter read)
Configure communication channel and detect slave serial devices.(if master)
Detect the expansion modules and update Expansion module information (Only at Power on)
Read the ladder address information.
Power Up Self Diagnosis
Set Power On system bit to '1'
Main Loop Start

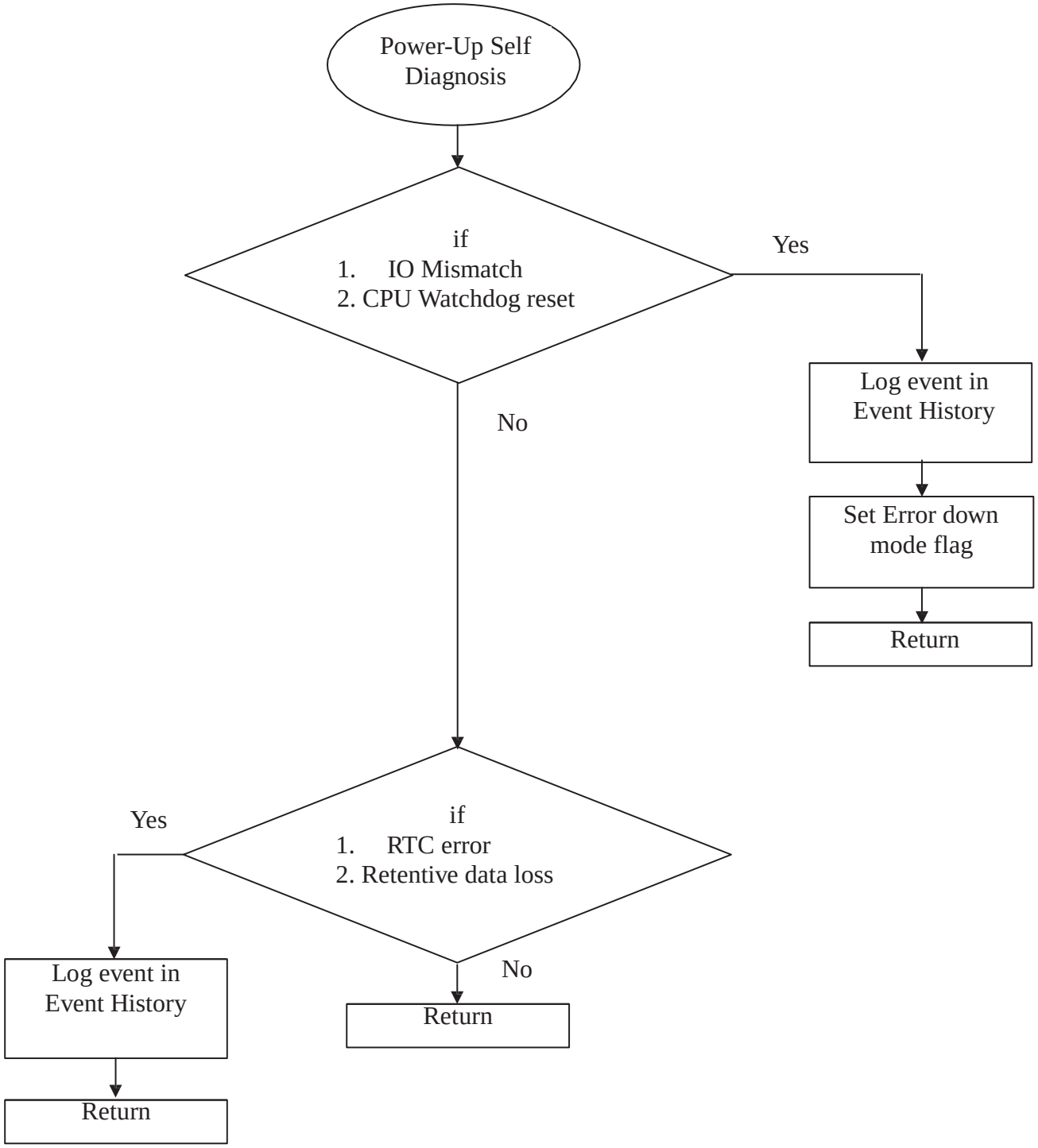

Main Loop Start
C
Start counting Main Loop Scan Time
Self Diagnosis
Error Down
ERROR MODE
OK
Read RUN/STOP Switch
STOP Position
HALT MODE
RUN Position
Update PLC mode from software
Hold Mode
Halt Mode
HOLD
Mode check
HALT MODE
RUN Mode or Switch position change from Stop to RUN
If power On System bit is '1'
No
D
Yes
Scan Local and expansion inputs
Turn On RUN Led
Clear non retentive PLC registers.
Execute Power-On Tasks.
Execute Power-Up ladder.
Enable User Timer Interrupt.
Initialize digital filter constant to default 10 mSec.
Reset Power On system bit to '0'
B

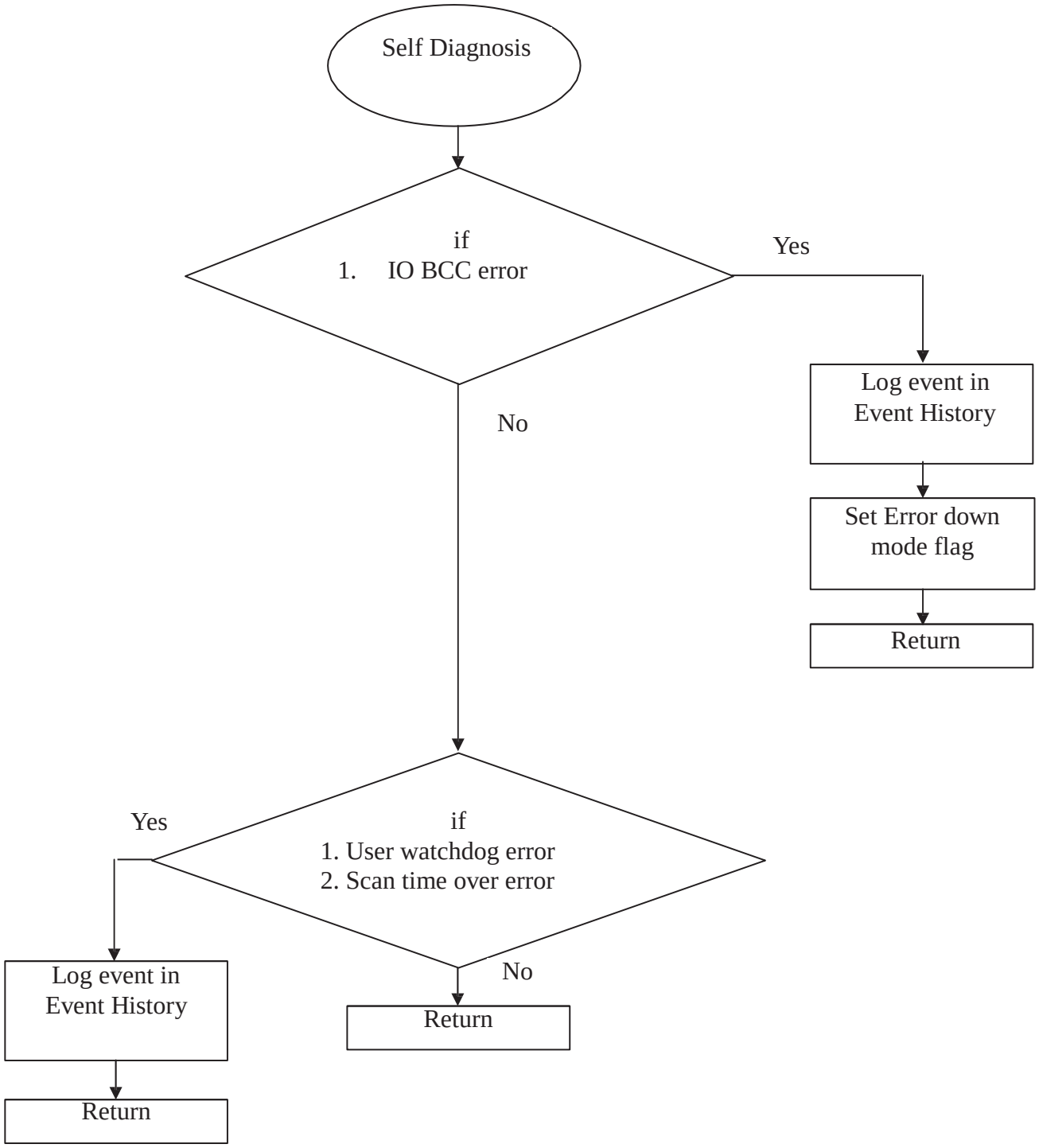

B
Update local, expansion.
D
Scan Local and expansion inputs
Execute Global Tasks
Feed the CPU watch-dog
Start counting ladder scan time
Execute main Ladder
Stop counting ladder scan time
Execute First Scan operations (1. Initialize special inputs and outputs. 2. Load Digital filter constant.)
Update High speed counter registers
Update local, expansion and PWM outputs
Feed watch-dog
Respond to the monitor query (if any) on USB.
Stop counting main loop scan time
C


HALT MODE
Feed Watch-do g
Turn OFF all Outputs and RUN Led
Respond to the monitor query (if any) on USB.
Stop counting main loop scan time
Set Power On system bit to ‘1’
Main Loop Start


ERROR MODE
Feed Watch-do g
Set the state of output as per ‘ERROR STATE OUTPUT CONDITION’ (Local, expansion and PWM)
Turn ON ERROR Led.
Turn OFF RUN Led.
Respond to the monitor query (if any) on USB.
Stop counting main loop scan time
Main Loop Start


HOLD MODE
Read Local and Expansion Inputs
Update Local, Expansion and PWM outputs
Respond to the monitor query (if any) on USB.
Stop counting main loop scan time
Main Loop Start


Power-Up Self Diagnosis
if
1. IO Mismatch
2. CPU Watchdog reset
Yes
Log event in Event History
Set Error down mode flag
Return
No
if
1. RTC error
2. Retentive data loss
Yes
Log event in Event History
Return
No
Return


Self Diagnosis
if
1. IO BCC error
Yes
Log event in
Event History
Set Error down
mode flag
Return
No
if
1. User watchdog error
2. Scan time over error
Yes
Log event in
Event History
Return
No
Return

1.4 V200 Series Specifications

The V200 series models possess powerful programmable logic features. User can implement logic, specific to application using standard Ladder programming.

V200 models need +24VDC power from an external supply.

Models included in the V200 Series are as follows:

Basic Models:

GPU288*3S	PLC Base model with 8 digital I/Ps and 8 Digital O/Ps
GPU232*3S	PLC card with 16 digital I/Ps and 16 Digital O/Ps
GPU200*3S	PLC Base model with ethernet

Expansion Models:

GDI216**S	16 Input Digital Module
GDO216P*S	16 PNP type transistor output digital module
GDO216N*S	16 NPN type transistor output digital module
GRO216**S	16 Relay type output digital module
GDD288P*S	8 Digital input, 8 PNP type transistor output digital module
GDD288N*S	8 Digital input, 8 NPN type transistor output digital module
GDR288**S	8 Digital input, 8 Relay type output digital module
GAD208**S	0-10 VDC or 4-20 mA (16 Bit), 8 channels input.
GRT280**S	RTD PT100 (16 Bit), 8 channels input.
GDA204**S	4 channel 0-10 VDC or 4-20 mA (16 Bit) Output.
GAA242**S	4 channel Universal Analog Inputs (RTD PT100, TC, 4-20 mA, 0-20mA, 0-50mV, 0 - 100mV, 0-10VDC), 16 Bit 2 channel 0-10 VDC or 4-20 mA (16 Bit) Output

1.4.1 Comparison between basic models (GPU288*3S & GPU232*3S)

Functional Specific.	GPU288	GPU232
Case	Case	Open PCB with DIN rail Mounting
Ladder Program Memeory	8K Steps	8K Steps
Expansion I/O capacity	Maximum 8 expansion modules	None
Expansion Bus	SPI (1MHz)	SPI (1MHz)
Local I/Os	16 (8 IN / 8 OUT).	32 (16 IN / 16 OUT)
Processing time	1 uSec. for NO/NC	1 uSec. for NO/NC
Input registers	400 Words Max.	400 Words Max.
Output registers	400 Words Max.	400 Words Max.
Data registers	4096 words	4096 words
Retentive registers	1400 words (EEPROM)	1400 words (EEPROM)
System registers	256 words	256 words
Configuration Register	1600 words Max.	1600 words Max.
Timer Registers	256 words	256 words
Counter Registers	256 words	256 words
Timer Devices	256 points	256 points
Counter Devices	256 points	256 points
HS Counter	2 HS counter inputs, single phase. (50KHz). 32 bit.	2 HS counter inputs, single phase. (50KHz). 32 bit.
System Coil	100 points	100 points
Communication ports	2 COM ports. COM1: RS232 and RS485. 2-wire RS-485 One USB port for programming.	2 COM ports. COM1: RS232. COM2: COM2: 2-wire RS-485 One USB port for programming.
Ethernet	-	-
Power Supply Spec.:		
Supply Voltage	24VDC, +/-15%	24VDC, +/-15%
Maximum Input current	150mA at 24VDC (Without expansion)	150mA at 24VDC (Without expansion)
Inrush Current	8A at 24VDC (Without expansion)	8A at 24VDC (Without expansion)
Dielectric Strength (PS and internal circuit)	1500 VDC, 1 minute	1500 VDC, 1 minute
Insulation Resistance (PS and internal circuit)	Minimum 10M ohm	Minimum 10M ohm

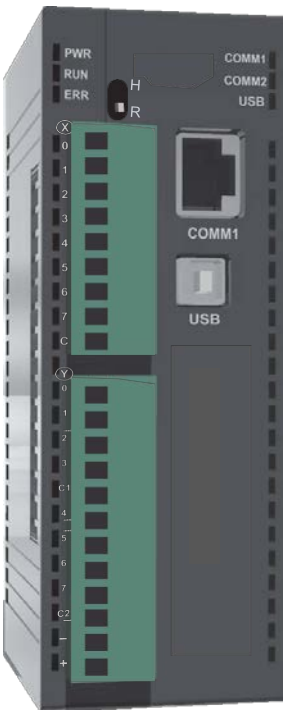
1.4.2 Comparison between basic models (GPU200*3S & GPU236*3S)

Functional Specific.	GPU200	GPU236 (Under Development)
Case	V200 Case	Open PCB with DIN rail Mounting
Ladder Program Memory	8K Steps	8K Steps
Expansion I/O capacity	Maximum 8 expansion modules	Maximum 8 expansion modules
Expansion Bus	SPI (1MHz)	SPI (1MHz)
Local I/Os	-	32 (16 IN / 16 OUT)
Processing time	1 uSec. for NO/NC	1 uSec. for NO/NC
Input registers	400 Words Max.	400 Words Max.
Output registers	400 Words Max.	400 Words Max.
Data registers	4096 words	4096 words
Retentive registers	1400 words (EEPROM)	1400 words (EEPROM)
System registers	256 words	256 words
Configuration Register	1600 words Max.	1600 words Max.
Timer Registers	256 words	256 words
Counter Registers	256 words	256 words
Timer Devices	256 points	256 points
Counter Devices	256 points	256 points
HS Counter	-	2 HS counter inputs, single phase. (100KHz). 32 bit.
System Coil	100 points	100 points
Communication ports	2 COM ports. COM1: RS232 and RS485. 2-wire RS-485 One USB port	2 COM ports. COM1: RS232. COM2: COM2: 2-wire RS-485 One USB port
Ethernet	10/100 Mbps ethernet port	10/100 Mbps ethernet port
Power Supply Spec.:		
Supply Voltage	24VDC, +/-15%	24VDC, +/-15%
Maximum Input current	330mA at 24VDC (Without expansion)	330mA at 24VDC (Without expansion)
Inrush Current	8A at 24VDC (Without expansion)	8A at 24VDC (Without expansion)
Dielectric Strength (PS and internal circuit)	1500 VDC, 1 minute	1500 VDC, 1 minute
Insulation Resistance (PS and internal circuit)	Minimum 10M ohm	Minimum 10M ohm

1.4.3 Specification for Basic Models

GPU288*3S

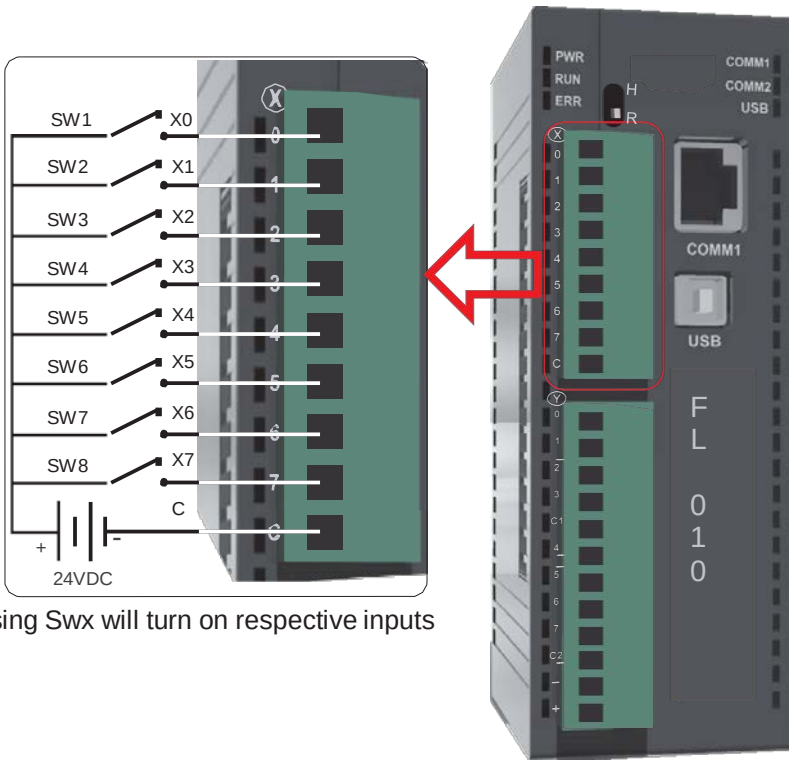
Power Supply	24VDC, 330mA
Input per channel	24 VDC, 5mA & 20mA (for CH0 & CH1)
Output per channel	230V / 2A or 24VDC / 2A for Relay, 0.5A at 24VDC for transistor
Approvals	CE, UL
Memory	
Total Program Memory	8K Steps
User Data	
Input Registers	400 Words / 6400 pts. (Max.*)
Outout Registers	400 Words / 6400 pts. (Max.*)
Data Registers	4096 words
Retentive Registers	1400 words (EEPROM)
System Registers	256 words
Timer Registers	256 words
Counter Register	256 words
Timer Devices	256 points
System Devices	100 points
Counter Devices	256 points
Configuration Register	1600 Words / 25600 pts. (Max.*)
Communication Ports	
2 COM Ports:	COM1: RS232 and RS485 COM2: 2-wire RS485
1 USB:	For programming
IO Specifications:	
Expansion IO capacity	8 expansion modules
Expansion Bus	SPI (1 MHz)
Local IOs	16 (8 IN / 8 OUT)
Digital Inputs	8 Bidirectional Digital inputs (2 High Speed inputs of upto 50KHz). 8 points per common.
Rated Input voltage	24VDC
Rated Input Current	Upto 5mA. (20mA for High Speed I/Ps)
Input Impedance	5.4Kohm (1.2Kohm for High Speed i/ps)
Minimum ON voltage	9.6 VDC
Maximum OFF voltage	3.6 VDC
Turn ON time	10 msec
Turn OFF time	10 msec
Isolation	Optically isolated from internal circuit
Digital outputs	6 Relay (Form A) outputs. 3 points per common. 2 Transistor Output
Output Capacity	2A per o/p for Relay (6A per common), 0.5 A for transistor
Rated load	230V / 2A, 30VDC / 2A for Relay, 0.5 A at 24VDC for transistor



Special Input Function	
HS Counter	2HS Counter inputs, single phase (50 KHZ), 32 Bit Dual Phase 1X, 2X, 4X (5KHz)
Interrupt Input	2 Points
PWM Output	CW / CCW OR PLS / DIR
Connection method	Removable terminals (3.81mm pitch)
General	
Operating Temperature	0 to 55 deg.C.
Storage Temperature	-20 to 85 deg.C.
Operating Humidity	10% to 90% (Non condensing)
Vibration Tests	Frequency 10Hz to 150hz Displacement +/- 0.35mm Crossover frequency 59Hz Acceleration: 2g Sweep rate : 1 octave per min Duration : 20 Sweeps / Axis app (2Hr 30min) Axis , X,Y, Z
Shock Test	25 g acceleration with 11 ms 3 Shocks each **AXIS** (a total of 18 Shocks)
Mechanical Dimension	100mm X 35mm X 70mm
Weight	200 gm.

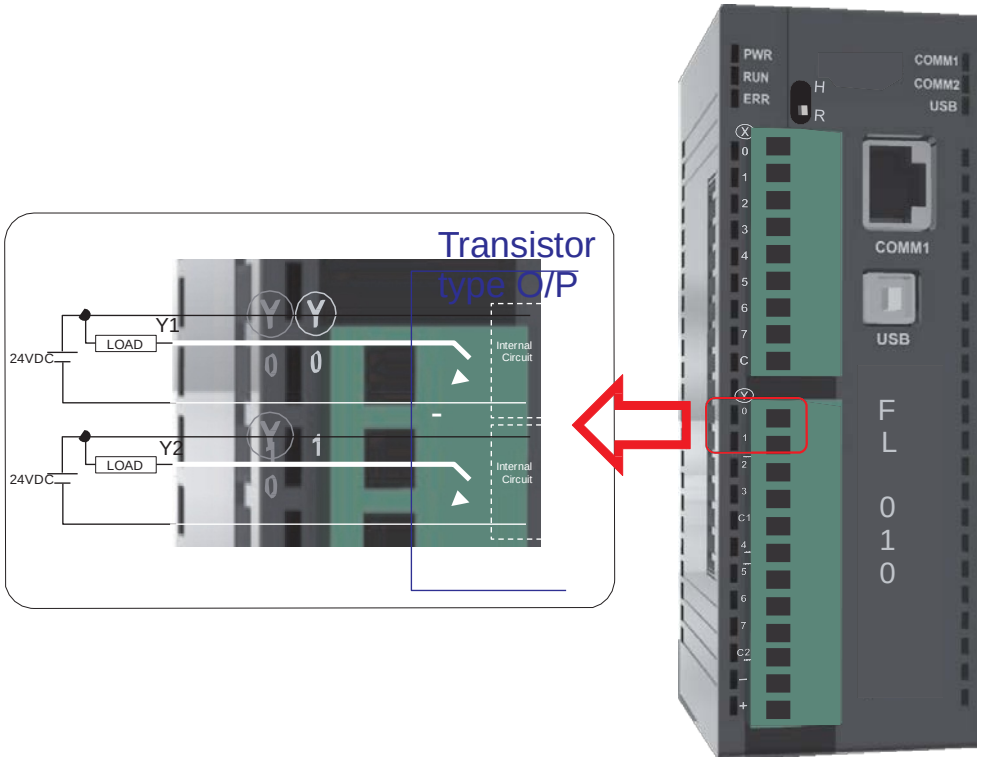
Note:
* : Depends upon I/O allocation.

Wiring Diagram for Digital I/Ps and O/Ps of model V288*3S CPU:
1. Wiring diagram for testing digital inputs:
Note: X0 and X1 are high speed input

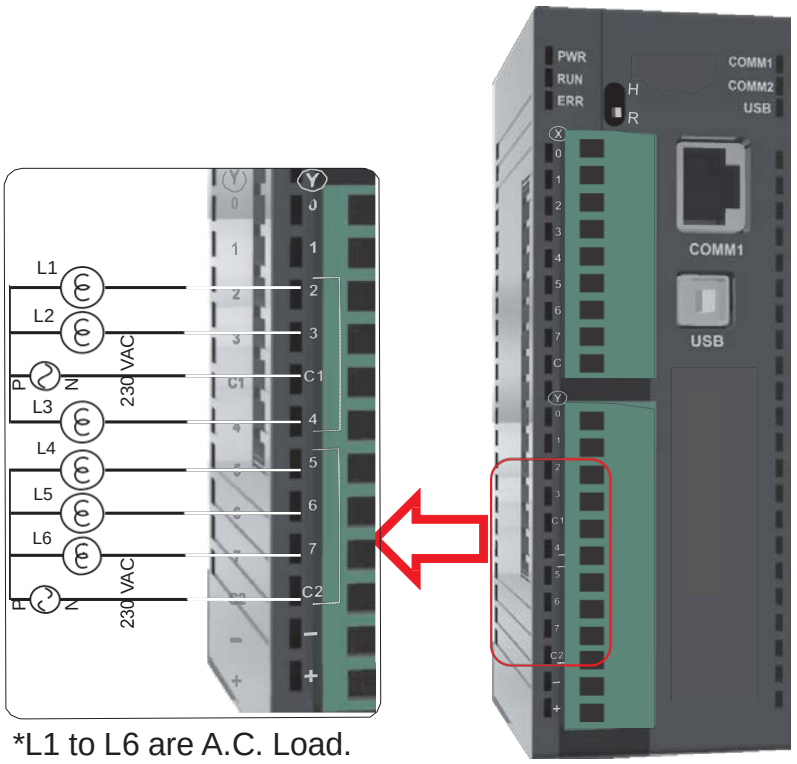


Closing Swx will turn on respective inputs

Wiring for transistor type outputs:



Wiring for output connections:



*L1 to L6 are A.C. Load.

GPU232*3S

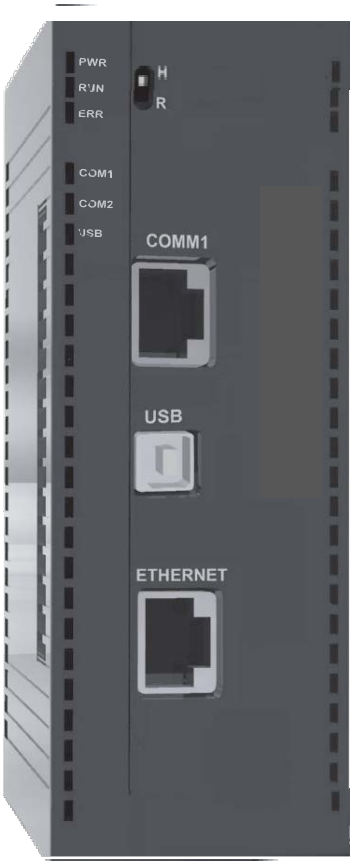
Power Supply	24VDC, 330mA
Input per channel	24 VDC, 5mA & 20mA for High Speed inputs (CH1 & CH2)
Output per channel	24VDC; 0.5A
Approvals	CE, UL
Memory	
Total Program Memory	8K Steps
User Data	
Input Registers	400 Words / 6400 pts. (Max.*)
Outout Registers	400 Words / 6400 pts. (Max.*)
Data Registers	4096 words
Retentive Registers	1400 words (EEPROM)
System Registers	256 words
Timer Registers	256 words
Counter Register	256 words
Timer Devices	256 points
System Devices	100 points
Counter Devices	256 points
Configuration Register	1600 Words / 25600 pts. (Max.*)
Communication Ports	
2 COM Ports:	COM1: RS232 COM2: 2-wire RS485
1 USB:	For programming
IO Specifications:	
Expansion IO capacity	8 expansion modules
Expansion Bus	SPI (1 MHz)
Local IOs	32 (16 IN / 16 OUT)
Digital Inputs	16 Bidirectional Digital inputs (2 High Speed inputs of upto 50KHz). 16 points per common.
Rated Input voltage	24VDC
Rated Input Current	Upto 5mA. (20mA for High Speed I/Ps)
Input Impedance	5.4Kohm (1.2Kohm for High Speed i/ps)
Minimum ON voltage	9.6 VDC
Maximum OFF voltage	3.6 VDC
Turn ON time	10 msec
Turn OFF time	10 msec
Isolation	Optically isolated from internal circuit
Digital outputs	16 PNP transistor outputs.
Output Capacity	0.5 A for transistor
Rated load	0.5 A at 24VDC for transistor

Special Input Function	
HS Counter	2HS Counter inputs, single phase (50 KHZ), 32 Bit Dual Phase 1X, 2X, 4X (5KHz)
Interrupt Input	2 Points
Connection method	Removable terminals (3.81mm pitch)
General	
Operating Temperature	0 to 55 deg.C.
Storage Temperature	-20 to 85 deg.C.
Operating Humidity	10% to 90% (Non condensing)
Vibration Tests	Frequency 10Hz to 150hz Displacement +/- 0.35mm Crossover frequency 59Hz Acceleration: 2g Sweep rate : 1 octave per min Duration : 20 Sweeps / Axis app (2Hr 30min) Axis , X,Y, Z
Shock Test	25 g acceleration with 11 ms 3 Shocks each **AXIS** (a total of 18 Shocks)
Mechanical Dimension	155mm X 102mm
Weight	180 gm

Note:
* : Depends upon I/O allocation.

GPU200*3S

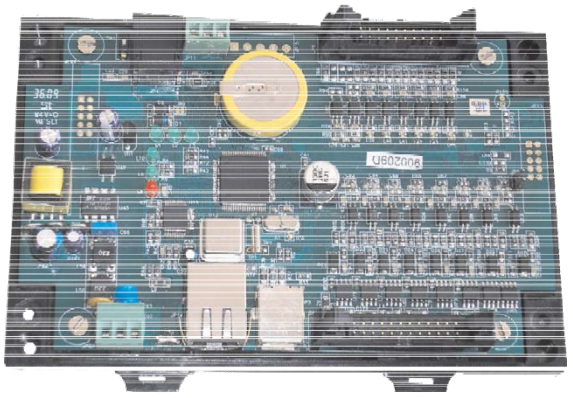
Power Supply	24VDC, 150mA
Input per channel	NA
Output per channel	NA
Standards	CE, UL
Memory	
Total Program Memory	8K Steps
User Data	
Input Registers	400 Words / 6400 pts. (Max.*)
Outout Registers	400 Words / 6400 pts. (Max.*)
Data Registers	4096 words
Retentive Registers	1400 words (EEPROM)
System Registers	256 words
Timer Registers	256 words
Counter Register	256 words
Timer Devices	256 points
System Devices	100 points
Counter Devices	256 points
Configuration Register	1600 Words / 25600 pts. (Max.*)
Communication Ports	
2 COM Ports:	COM1: RS232/RS485 COM2: 2-wire RS485
1 USB:	For programming
1 Ethernet:	10/100 MBBS For PLC communication and Configuration
IO Specifications:	
Expansion IO capacity	8 expansion modules
Expansion Bus	SPI (1 MHz)
Local I/Os	None
General	
Mechanical Dimension	100mm X 35mm X 70mm
Weight	200 gm.



Note:
* : Depends upon I/O allocation.

GPU236 -Under Development

Power Supply	24VDC, 150mA
Input per channel	24 VDC, 5mA & 20mA for high speed inputs (CH1 & CH2)
Output per channel	24VDC; 0.5A
Standards	CE, UL
Memory	
Total Program Memory	8K Steps
User Data	
Input Registers	400 Words / 6400 pts. (Max.*)
Outout Registers	400 Words / 6400 pts. (Max.*)
Data Registers	4096 words
Retentive Registers	1400 words (EEPROM)
System Registers	256 words
Timer Registers	256 words
Counter Register	256 words
Timer Devices	256 points
System Devices	100 points
Counter Devices	256 points
Configuration Register	1600 Words / 25600 pts. (Max.*)
Communication Ports	
2 COM Ports:	COM1: RS232 and RS485 COM2: 2-wire RS485
1 USB:	For programming
1 Ethernet:	10/100 MBBS For PLC communication and Configuration
IO Specifications:	
Expansion IO capacity	8 expansion modules
Expansion Bus	SPI (1 MHz)
Local IOs	32 (16 IN / 16 OUT)
Digital Inputs	16 Bidirectional Digital inputs (2 High Speed inputs of upto 50KHz). 16 points per common.
Rated Input voltage	24VDC
Rated Input Current	Upto 5mA. (20mA for High Speed I/Ps)
Input Impedance	5.4Kohm (1.2Kohm for High Speed i/ps)
Minimum ON voltage	9.6 VDC
Maximum OFF voltage	3.6 VDC
Turn ON time	10 msec
Turn OFF time	10 msec
Isolation	Optically isolated from internal circuit
Digital outputs	16 PNP Transistor Output
Output Capacity	0.5 A for transistor
Rated load	0.5 A at 24VDC for transistor



Special Input Function	
HS Counter	2HS Counter inputs, single phase (50 KHZ), 32 Bit Dual Phase 1X, 2X, 4X (5KHz)
Interrupt Input	2 Points
Connection method	Removable terminals (3.81mm pitch)
General	
Operating Temperature	0 to 55 deg.C.
Storage Temperature	-20 to 85 deg.C.
Operating Humidity	10% to 90% (Non condensing)
Vibration Tests	Frequency 10Hz to 150hz Displacement +/- 0.35mm Crossover frequency 59Hz Acceleration: 2g Sweep rate : 1 octave per min Duration : 20 Sweeps / Axis app (2Hr 30min) Axis , X,Y, Z
Shock Test	25 g acceleration with 11 ms 3 Shocks each **AXIS** (a total of 18 Shocks)
Mechanical Dimension	155mm X 102mm
Weight	180 gm

Note:
* : Depends upon I/O allocation.

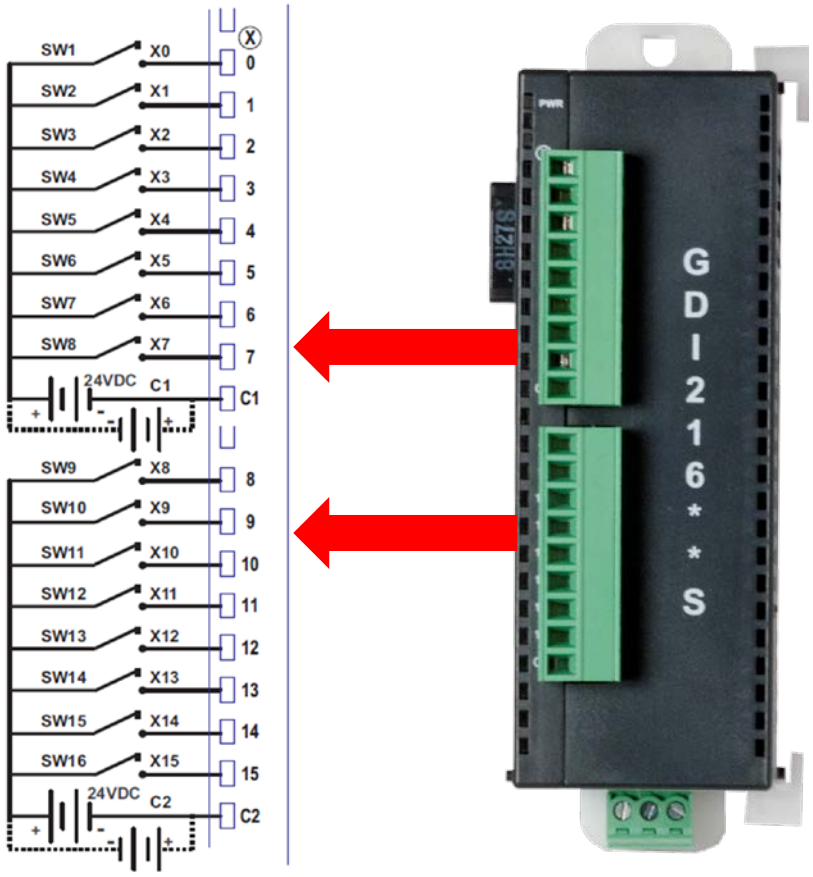
1.4.4 Specification for Expansion Models

GDI216S**

Digital Inputs	16 Normal Inputs, 8 points per common. Bidirectional type.
Input per channel	5mA, 24VDC
Output per channel	NA
Input Impedance	5.4K ohm
Minimum ON voltage	9.6 VDC
Maximum OFF voltage	3.6 VDC
Turn ON time	10 msec
Turn OFF time	10 msec
Isolation	Digital inputs are optically isolated from the internal circuit
Connection method	Removable terminals (3.81mm pitch)
Digital outputs	0
General	
Mechanical Dimension	100mm X 35mm X 70mm
Weight	150 gm.

Power Rating (Back Plane)	
Voltage Rating	3.75 VDC derived from base model
Current Rating	Upto 80mA

Wiring Diagram for GDI216**S



Closing Swx will turn on respective inputs

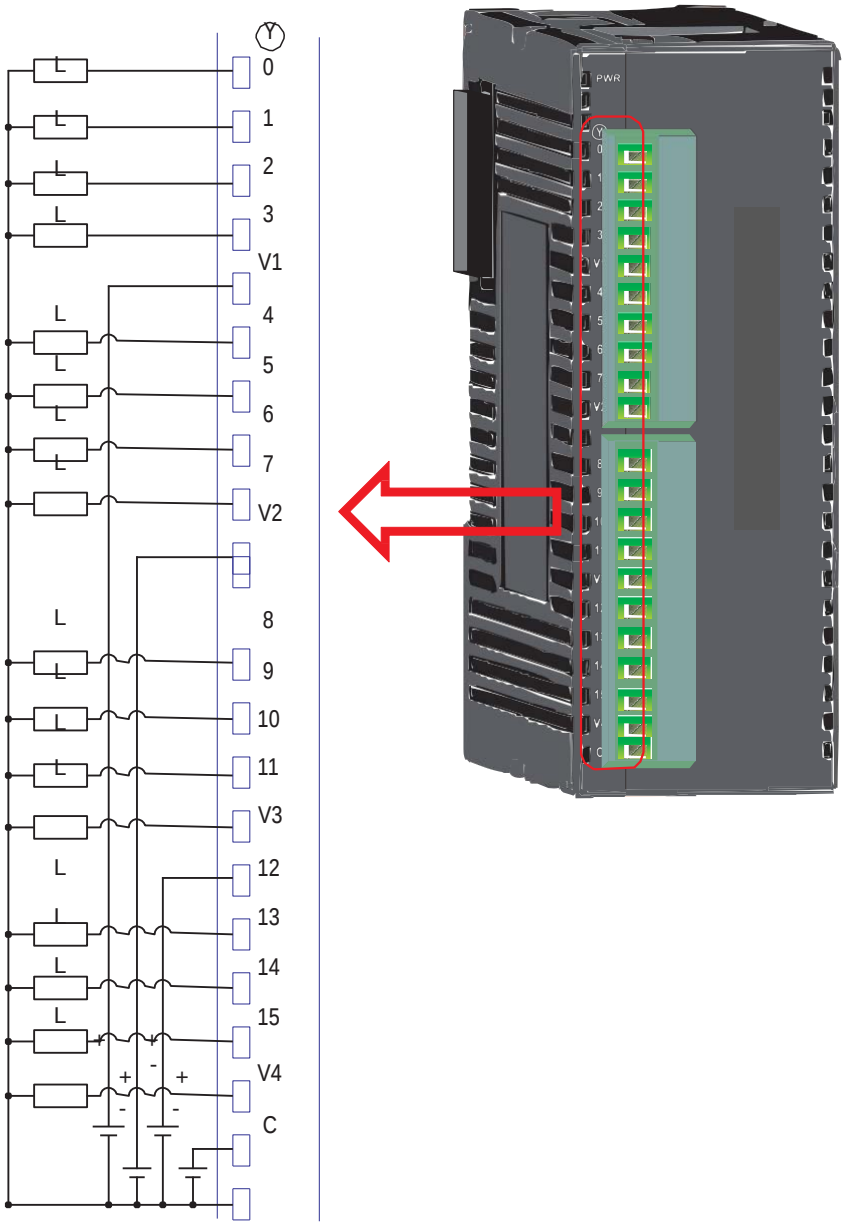
GDO216P*S (PNP Type transistor output)

Digital Inputs	0
Digital outputs	16 PNP type Transistor output. 4 points per common
Rated load	500mA max for PNP and NPN type transistor output
General	
Mechanical Dimension	100mm X 35mm X 70mm
Weight	150 gm.

Power Supply	24VDC, 300mA
Input per channel	NA
Output per channel	0.5A, 24VDC per output

Power Rating (Back Plane)	
Voltage Rating	3.75 VDC derived from base model
Current Rating	Upto 80mA

Wiring Diagram for GDO216P**S



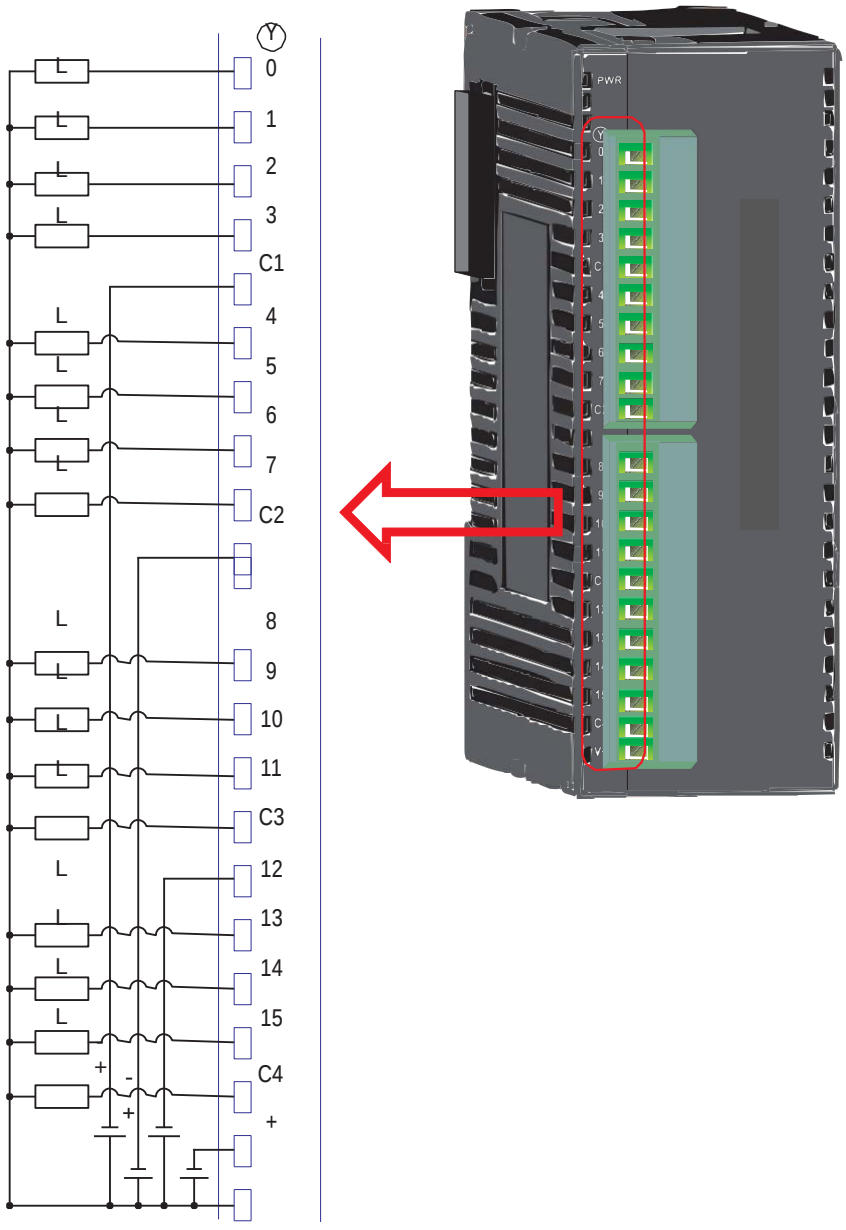
GDO216N*3S (NPN Type transistor output)

Digital Inputs	0
Digital outputs	16 NPN type Transistor output. 4 points per common
Rated load	500mA max for PNP and NPN type transistor output
General	
Mechanical Dimension	100mm X 35mm X 70mm
Weight	150 gm.

Power Supply	24VDC, 300mA
Input per channel	NA
Output per channel	0.5A, 24VDC per output

Power Rating (Back Plane)	
Voltage Rating	3.75 VDC derived from base model
Current Rating	Upto 80mA

Wiring Diagram for GDO216N**S



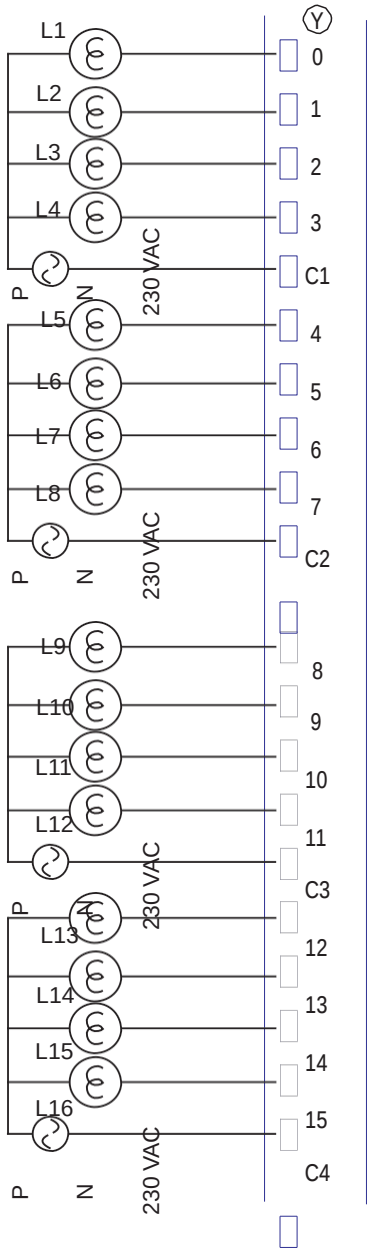
GDR216**S (Relay Type output)

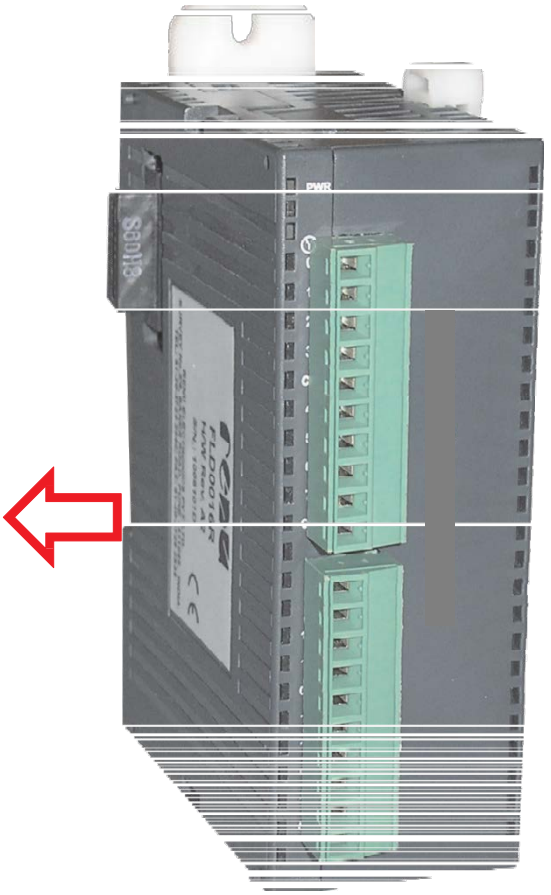
Digital Inputs	0
Digital outputs	16 Relay (Form A) output. 4 points per common
Rated load	230V / 2A, 30VDC / 2A
General	
Mechanical Dimension	100mm X 35mm X 70mm
Weight	150 gm.

Power Supply	24VDC, 300mA
Input per channel	NA
Output per channel	230V, 2A / 30 VDC, 2A per output

Power Rating (Back Plane)	
Voltage Rating	3.75 VDC derived from base model
Current Rating	Upto 80mA

Wiring Diagram for GDR216**S





*L1 to L16 are A.C. Load.

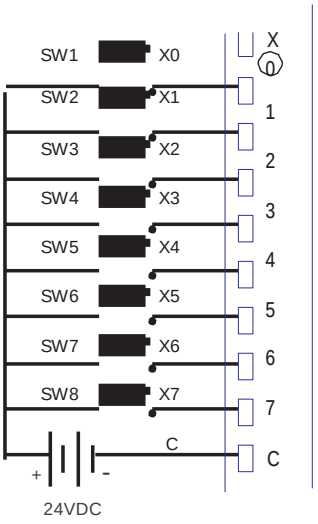
GDR288**S (Relay Type Output)
GDD288P*S (PNP Type transistor output)
GDD288N*S (NPN Type transistor output)

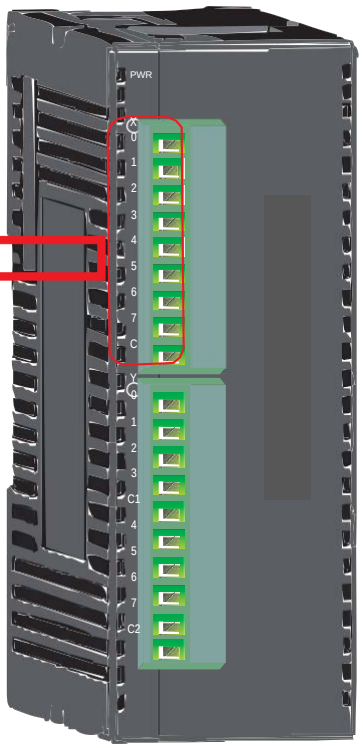
Digital Inputs	8 Normal inputs 4 points per common. Bidirectional type.
Digital outputs	8 Relay (Form A) outputs. 4 points per common.
	8 PNP type Transistor output. 4 points per common.
	8 NPN type Transistor output. 4 points per common.
Rated Input voltage	24VDC
Rated Input Current	Upto 5mA
Input Impedance	5.4K ohm
Minimum ON voltage	9.6 VDC
Maximum OFF voltage	3.6 VDC
Turn ON time	10 msec
Turn OFF time	10 msec
Isolation	Optically isolated from the internal circuit
Connection method	Removable terminals (3.81mm pitch)
Output Capacity	2A per o/p. 8A per common for Relay type output
	500mA max for PNP and NPN type transistor output
Rated load	230V / 2A, 30VDC / 2A (for Relay), 500mA at 24VDC (for transistor)
General	
Operating Temperature	0 to 55 deg.C.
Storage Temperature	-20 to 85 deg.C.
Operating Humidity	10% to 90% (Non condensing)
Vibration	10Hz to 150Hz ,displacement of 0.2 mm (peak) (3 mutually perpendicular axes)
Shock	490.5 m/s2,2 half-sine shocks per axis, on 3 mutually perpendicular axes)
Mechanical Dimension	100mm X 35mm X 70mm
Weight	150 gm.
FTB (Fast Transient / Burst)	IEC61000-4-4 [2.2kV (Power- Direct Injection), 1.2KV (I/O - Capacitive clamp).]
Electrostatic discharge	IEC61000-4-2 Level 3
Electromagnetic field	IEC61000-4-3, 10 V/m AM modulation (80 MHz to 1 GHz)
RF Immunity	IEC61000-4-6, 10 V/m AM modulation (0.15MHz to 80 MHz)
Dumped Oscillatory wave	IEC61000-4-12
Surge Immunity	IEC61000-4-5 Level 2
Radiated emission	EN50081-2

Power Rating (Back Plane)	
Voltage Rating	3.75 VDC derived from base model
Current Rating	Upto 80mA
Power Supply:	24VDC, 50mA 100mA for relay coil supply
Input per channel:	24VDC, 5mA
Output per channel:	0.5 A, 24VDC and For GDR288*3S: 230V, 2A / 24VDC, 2A

Wiring Diagram for GDR288**S:

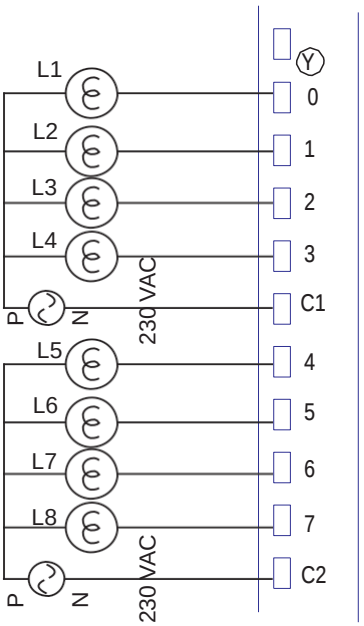
1. Wiring diagram for testing digital inputs:

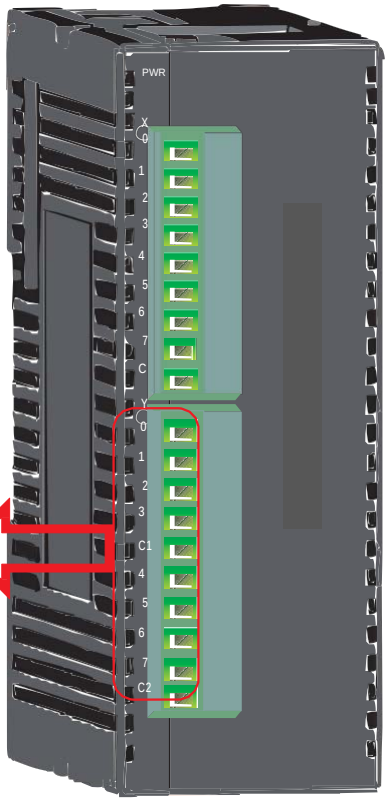




Closing Swx will turn on respective inputs

2. Wiring diagram for output connections:

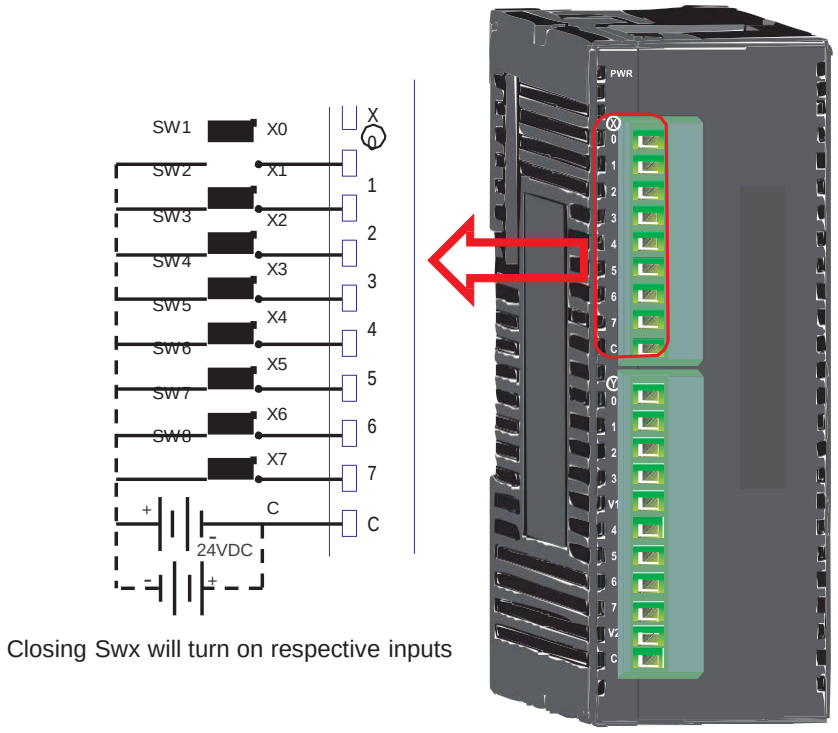




*L1 to L8 are A.C. Load.

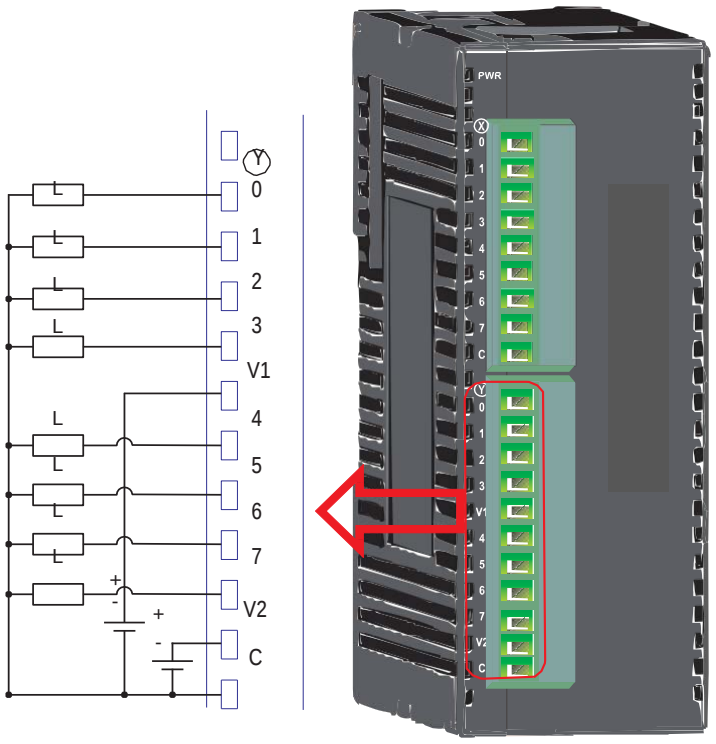
Wiring Diagram for GDD288P*S:

1. Wiring diagram for testing digital inputs:



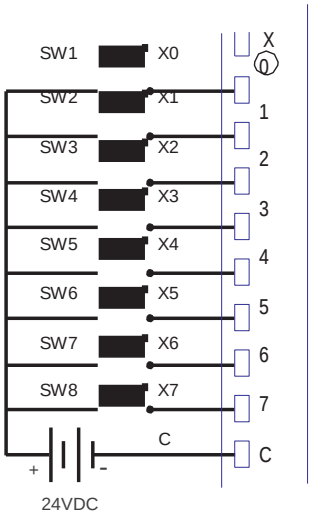
Closing Swx will turn on respective inputs

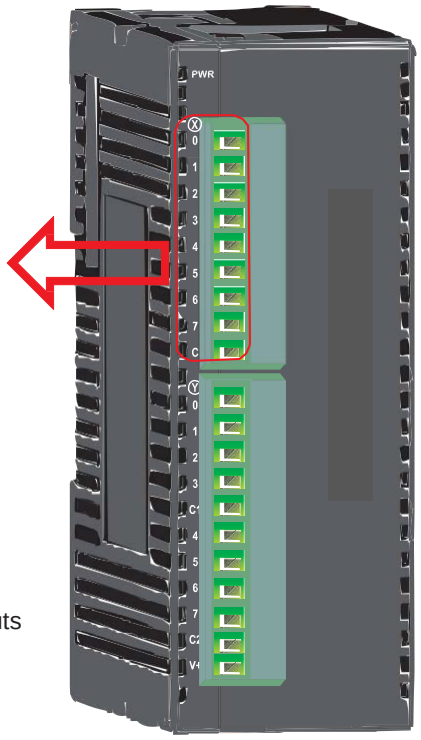
2. Wiring diagram for output connections:



Wiring Diagram for GDD288N*S:

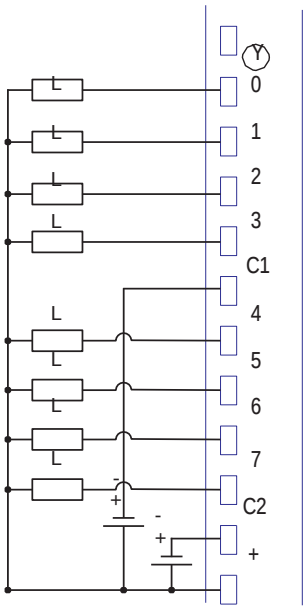
1. Wiring diagram for testing digital inputs:

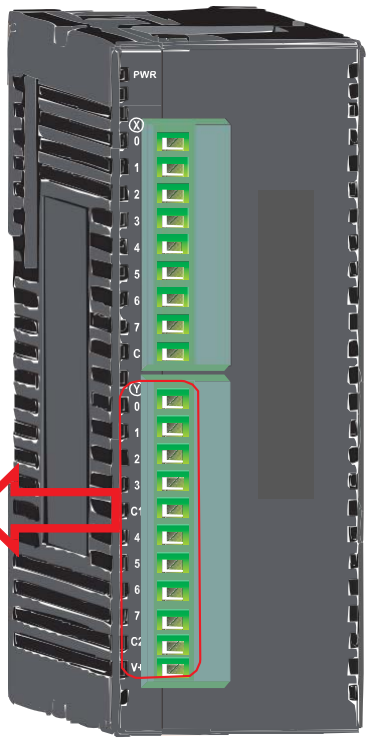




Closing Swx will turn on respective inputs

2. Wiring diagram for output connections:

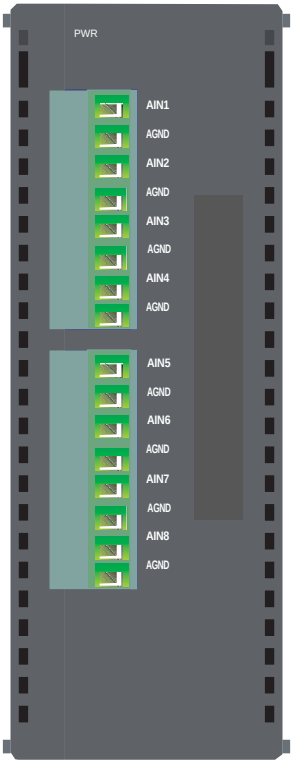




GAD208**S

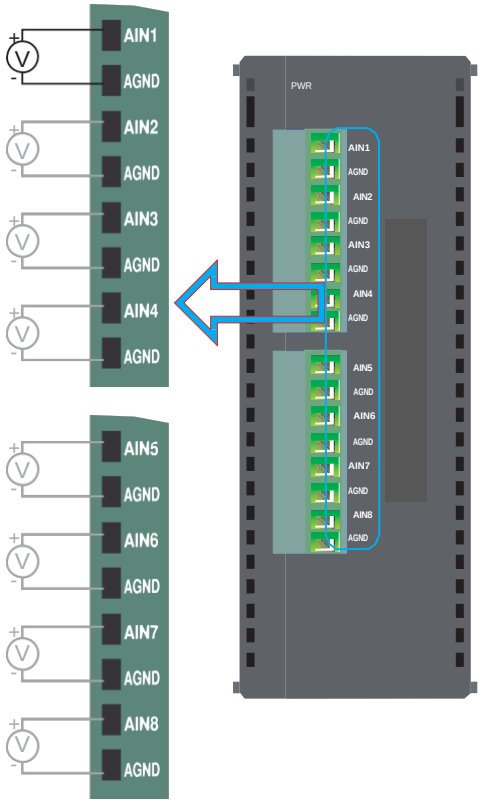
Analog Inputs	8 input channels Voltage Input 0 - 10 V Current Input 4- 20 mA
Analog Outputs	0
Isolation	Isolation between analog and digital section. No interchannel isolation. Power supply is isolated
Connection method	Removable terminals (3.81mm pitch)
Resolution	16 Bit
Accuracy	0.2 % of Full Scale
Nonlinearity	0.04% Max.
Input Impedance	470K ohm (voltage mode) 100 ohm (Current mode)
Temperature Drift	60 ppm
General	
Operating Temperature	0 to 55 Degree.
Storage Temperature	(-20) to 85 deg.C.
Operating Humidity	10 to 90 % (Non condensing)
Vibration	10Hz to 150Hz ,displace-ment of 0.2 mm (peak) (3 mutually perpendicular axes)
Shock	490.5 m/s2,2 half-sine shocks per axis, on 3 mutually perpendicular axes)
Mechanical Dimension	100mm X 35mm X 70mm
Weight	180 gm.
FTB Transient / Burst)	IEC61000-4-4 [2.2kV (Fast (Power- Direct Injection), 1.2KV (I/O - Capacitive clamp).]
Electrostatic discharge	IEC61000-4-2 Level 3
Electromagnetic field	IEC61000-4-3, 10 V/m AM modulation (80 MHz to 1 GHz)
RF Immunity	IEC61000-4-6, 10 V/m AM modulation (0.15MHz to 80 MHz)
Dumped Oscillatory wave	IEC61000-4-12
Surge Immunity	IEC61000-4-5 Level 2
Radiated emission	EN50081-2

Power Rating (Back Plane)	
Digital Side: Power derived from expansion slot connector	
Voltage Rating	3.75 VDC derived from base model
Current Rating	Upto 80mA
Power Supply:	24VDC, 100mA

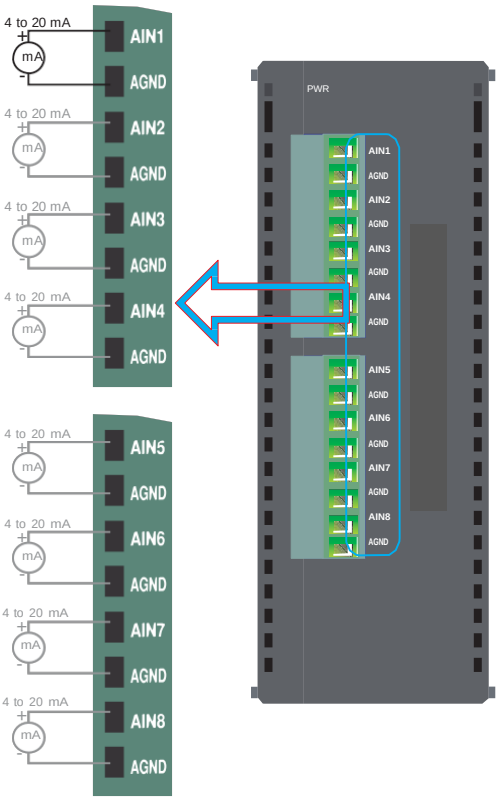


Wiring Diagram of input connection for GAD208**S:

1. Voltage Mode connections::



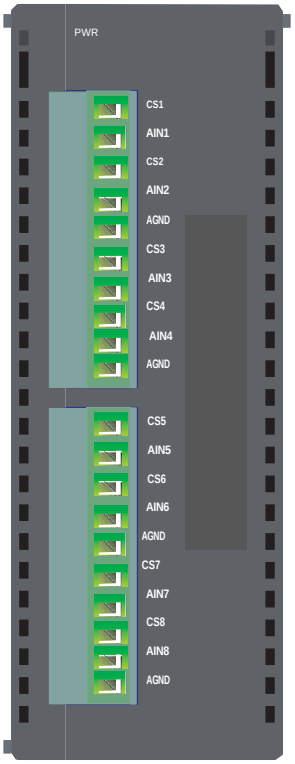
2. Current mode connections:



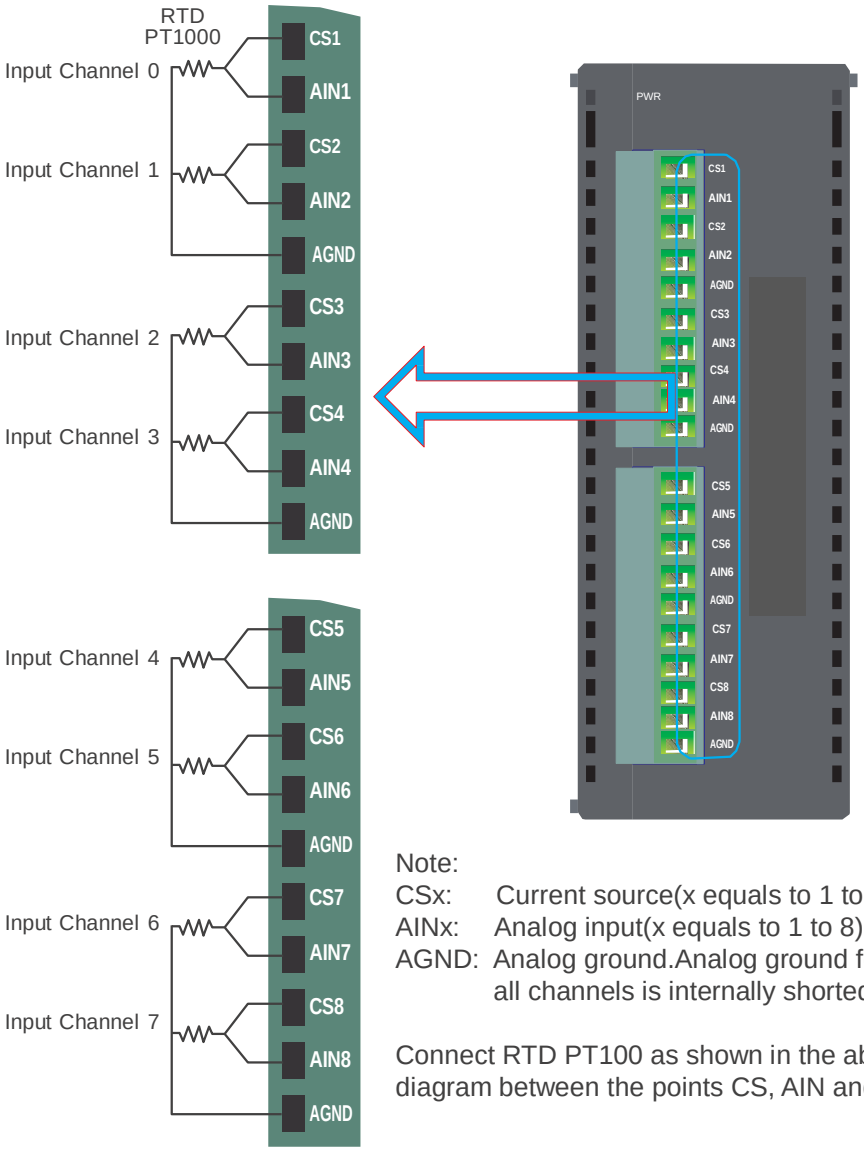
GRT208**S

Analog Inputs	8 input channels RTD PT100
Analog Outputs	0
Isolation	Isolation between analog and digital section. No interchannel isolation. Power supply is isolated
Connection method	Removable terminals (3.81mm pitch)
Resolution	16 Bit
Accuracy	0.2 % of Full Scale
Nonlinearity	0.04% Max.
Input Impedence	470K ohm (voltage mode) 100 ohm (Current mode)
Temperatur Drift	60 ppm
General	
Operating Temperature	0 to 55 Degree.
Storage Temperature	(-20) to 85 deg.C.
Operating Humidity	10 to 90 % (Non condensing)
Vibration	10Hz to 150Hz ,displace-ment of 0.2 mm (peak) (3 mutually perpendicular axes)
Shock	490.5 m/s2,2 half-sine shocks per axis, on 3 mutually perpendicular axes)
Mechanical Dimension	100mm X 35mm X 70mm
Weight	180 gm.
FTB Transient / Burst)	IEC61000-4-4 [2.2kV (Fast (Power- Direct Injection), 1.2KV (I/O - Capacitive clamp).]
Electrostatic discharge	IEC61000-4-2 Level 3
Electromagnetic field	IEC61000-4-3, 10 V/m AM modulation (80 MHz to 1 GHz)
RF Immunity	IEC61000-4-6, 10 V/m AM modulation (0.15MHz to 80 MHz)
Dumped Oscillatory wave	IEC61000-4-12
Surge Immunity	IEC61000-4-5 Level 2
Radiated emission	EN50081-2

Power Rating (Back Plane)	
Digital Side: Power derived from expansion slot connector	
Voltage Rating	3.75 VDC derived from base model
Current Rating	Upto 80mA
Power Supply:	24VDC, 100mA



Wiring Diagram of input connection for GRT208**S:



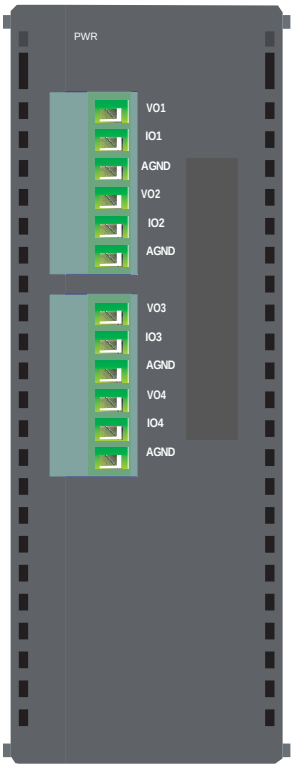
Note:
CSx: Current source(x equals to 1 to 8)
AINx: Analog input(x equals to 1 to 8)
AGND: Analog ground.Analog ground for all channels is internally shorted on PCB

Connect RTD PT100 as shown in the above diagram between the points CS, AIN and AGND

GDA204**S

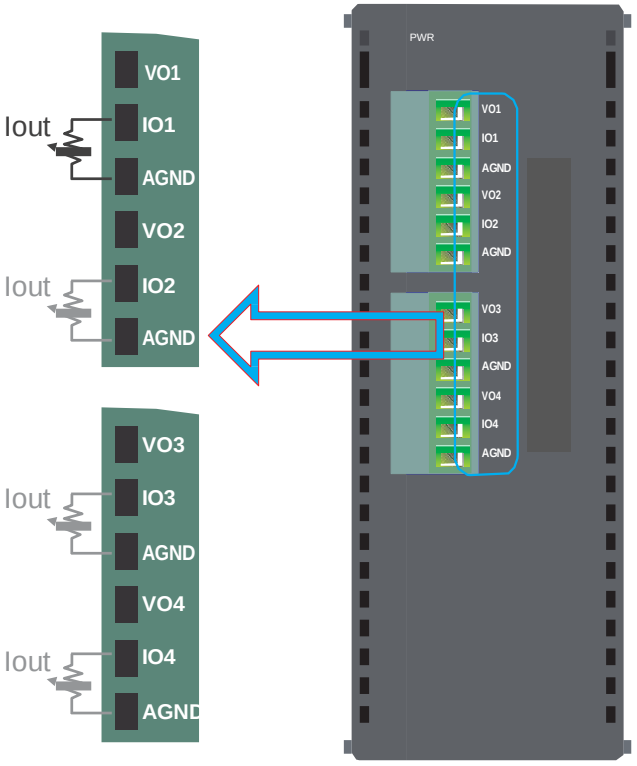
Analog Inputs	0
Analog Outputs	4 Output channels Voltage 0 - 10 V (Min Load 1000 ohm) Current 4 - 20 mA(Max load 500 ohm)
Isolation	Isolation between analog and digital section. No interchannel isolation. Power supply is isolated
Connection method	Removable terminals (3.81mm pitch)
Resolution	16 Bit
Accuracy	0.2 % of Full Scale
Nonlinearity	0.04% Max.
General	
Operating Temperature	0 to 55 Degree.
Storage Temperature	(-20) to 85 deg.C.
Operating Humidity	10 to 90 % (Non condensing)
Vibration	10Hz to 150Hz ,displacement of 0.2 mm (peak) (3 mutually perpendicular axes)
Shock	490.5 m/s2,2 half-sine shocks per axis, on 3 mutually perpendicular axes)
Mechanical Dimension	100mm X 35mm X 70mm
Weight	180 gm.
FTB (Fast Transient / Burst)	IEC61000-4-4 [2.2kV (Power- Direct Injection), 1.2KV (I/O - Capacitive clamp).]
Electrostatic discharge	IEC61000-4-2 Level 3
Electromagnetic field	IEC61000-4-3, 10 V/m AM modulation (80 MHz to 1 GHz)
RF Immunity	IEC61000-4-6, 10 V/m AM modulation (0.15MHz to 80 MHz)
Dumped Oscillatory wave	IEC61000-4-12
Surge Immunity	IEC61000-4-5 Level 2
Radiated emission	EN50081-2

Power Rating (Back Plane)	
Digital Side: Power derived from expansion slot	
Voltage Rating	3.75 VDC derived from base model
Current Rating	Upto 80mA
Power Supply:	24VDC, 150mA

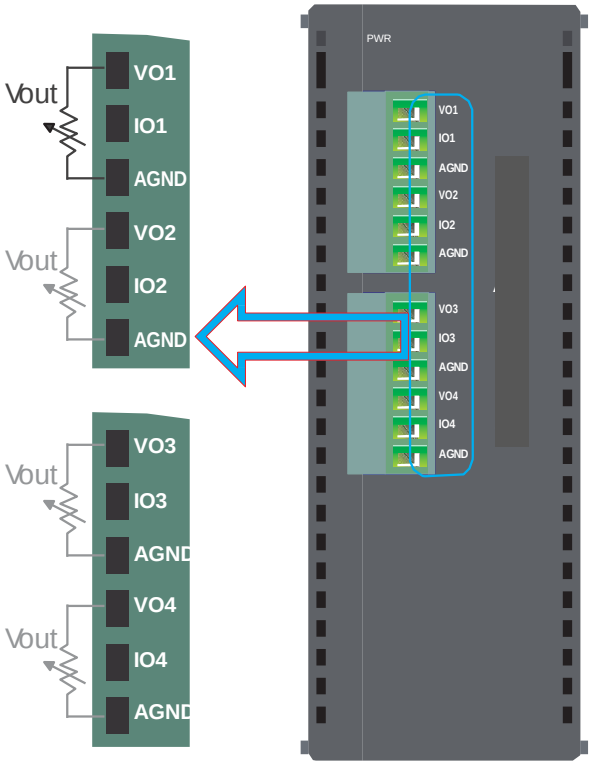


Wiring Diagram of input connection for GDA204**S:

1. Current Output Connection Diagram:



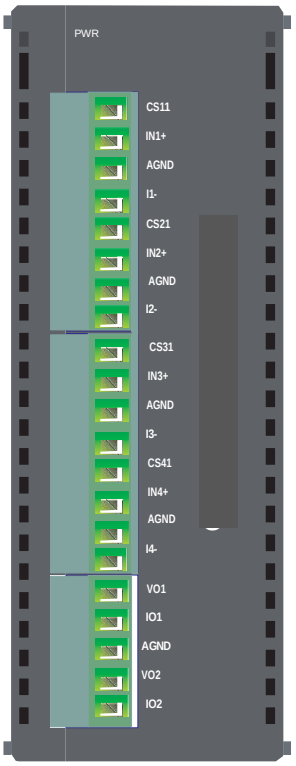
2. Voltage Output Connection Diagram:



GAA242**S

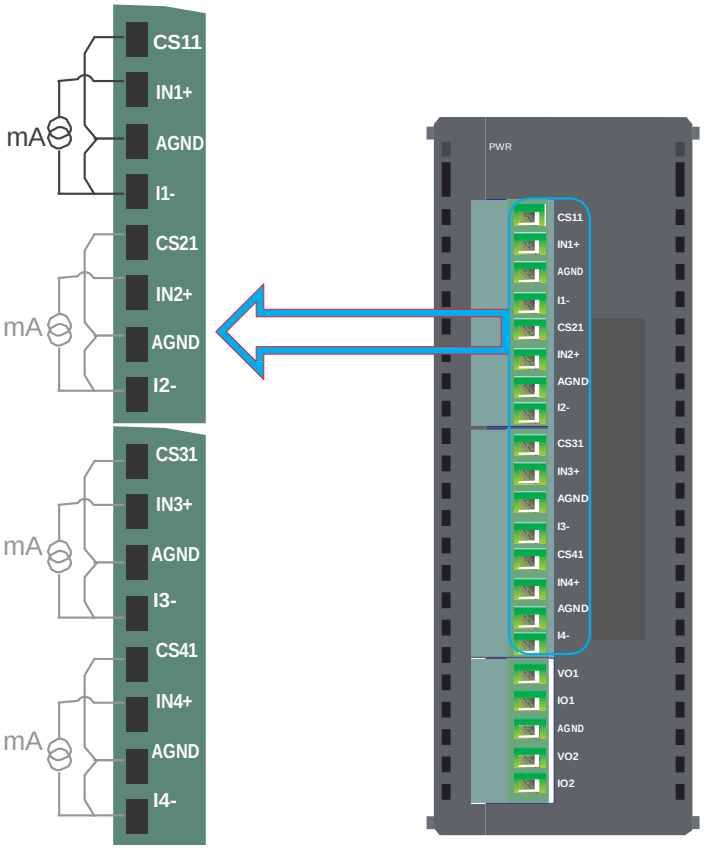
Analog Inputs	4 Universal Input Channels Voltage Input 0 - 10 V Current Input 0-20mA, 4-20mA RTD PT100 (alpha1, alpha2) Thermocouple(TYPE B,R,S,E,J,K,N,T.) mV 0-100mV, 0-50 mV
Analog Outputs	2 Output channels Voltage 0 - 10 V (Min Load 1000 ohm) or Current 4 - 20 mA (Max load 500 ohm)
Isolation	Isolation between analog and digital section. No inter-channel isolation. Power supply is isolated
Connection method	Removable terminals (3.81mm pitch)
Resolution	16 Bit
Accuracy	0.2 % of Full Scale
Nonlinearity	0.04% Max.
Input Impedance	1Mohm (Voltage/mV/TC/RTD mode) typically 30 ohm (Current mode)
Excitation Current for RTD	0.5 mA
General	
Operating Temperature	0 to 55 Degree.
Storage Temperature	(-20) to 85 deg.C.
Operating Humidity	10 to 90 % (Non condensing)
Vibration	10Hz to 150Hz ,displacement of 0.2 mm (peak) (3 mutually perpendicular axes)
Shock	490.5 m/s2,2 half-sine shocks per axis, on 3 mutually perpendicular axes)
Mechanical Dimension	100mm X 35mm X 70mm
Weight	180 gm.
FTB (Fast Transient / Burst)	IEC61000-4-4 [2.2kV (Power- Direct Injection), 1.2KV (I/O - Capacitive clamp).]
Electrostatic discharge	IEC61000-4-2 Level 3
Electromagnetic field	IEC61000-4-3, 10 V/m AM modulation (80 MHz to 1 GHz)
RF Immunity	IEC61000-4-6, 10 V/m AM modulation (0.15MHz to 80 MHz)
Dumped Oscillatory wave	IEC61000-4-12
Surge Immunity	IEC61000-4-5 Level 2
Radiated emission	EN50081-2

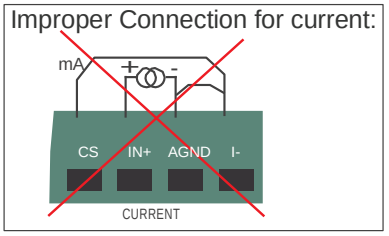
Power Rating (Back Plane)	
Digital Side: Power derived from expansion slot	
Voltage Rating	3.75 VDC derived from base model
Current Rating	Upto 80mA
Power Supply:	24VDC, 150mA



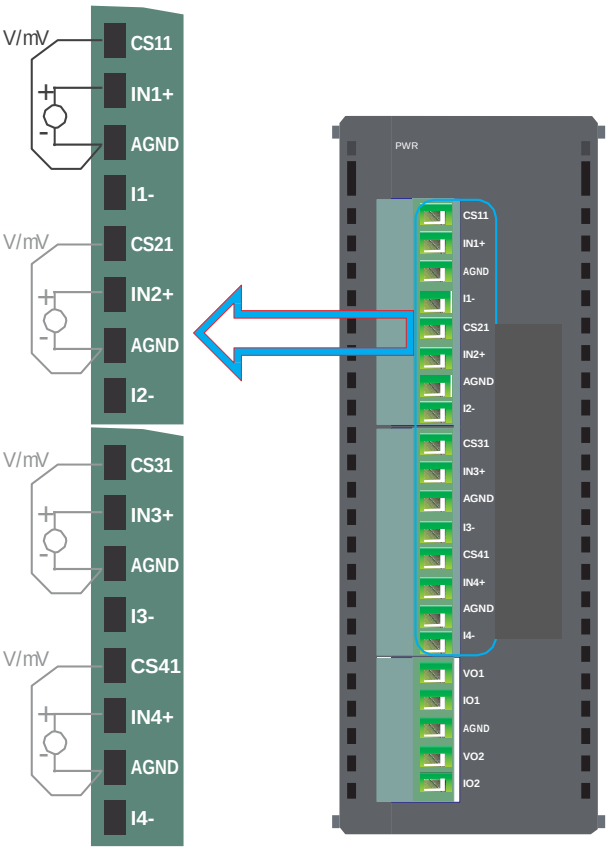
Wiring Diagram of input connection for GAA242**S:

1. Current Input Connection Diagram:

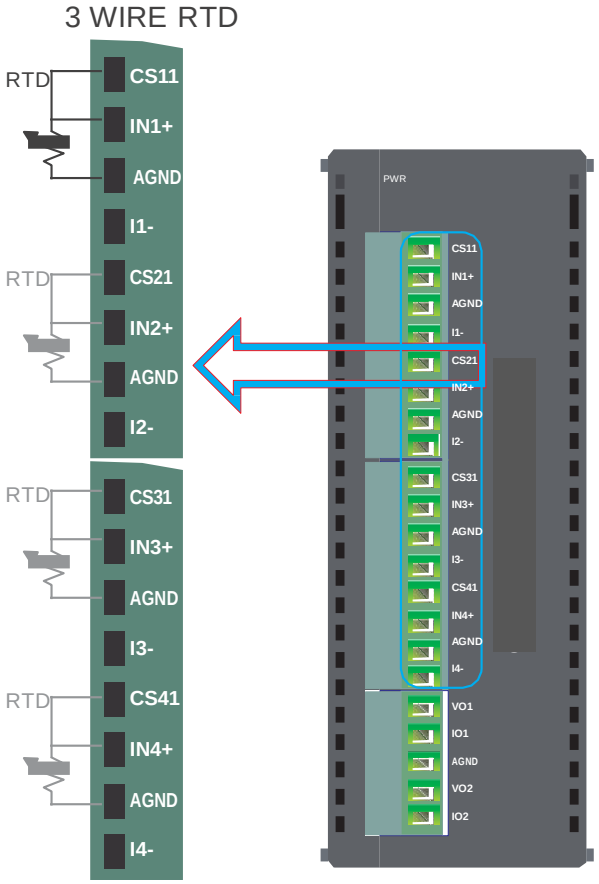




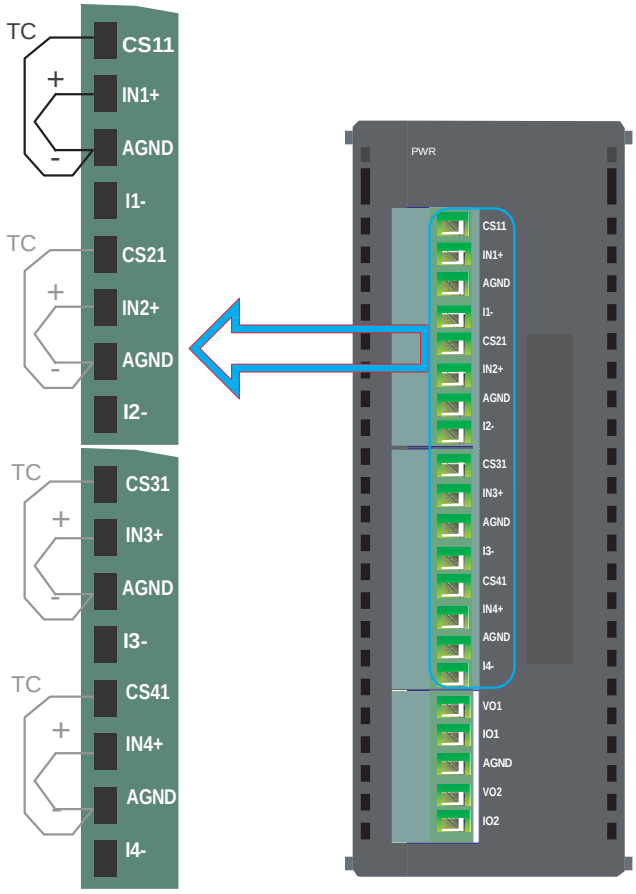
2. Voltage and mV Input Connection Diagram:



3. RTD Input Connection Diagram:

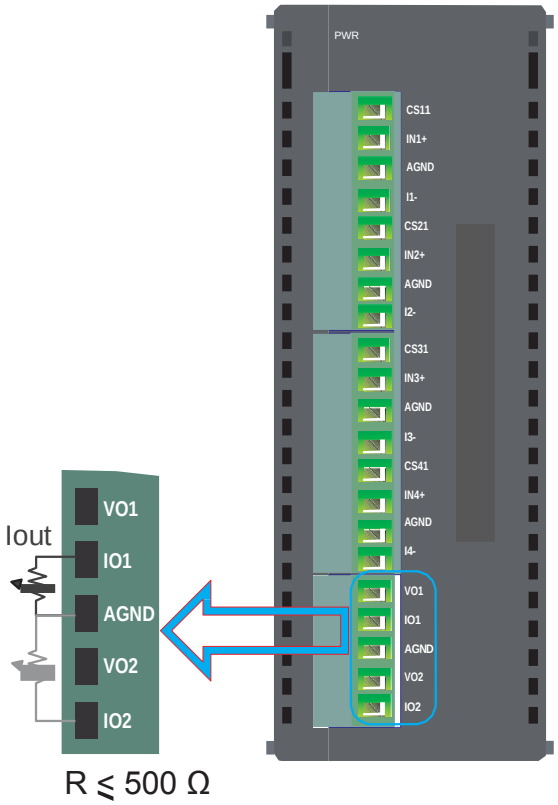


4. Thermocouple Input Connection Diagram:

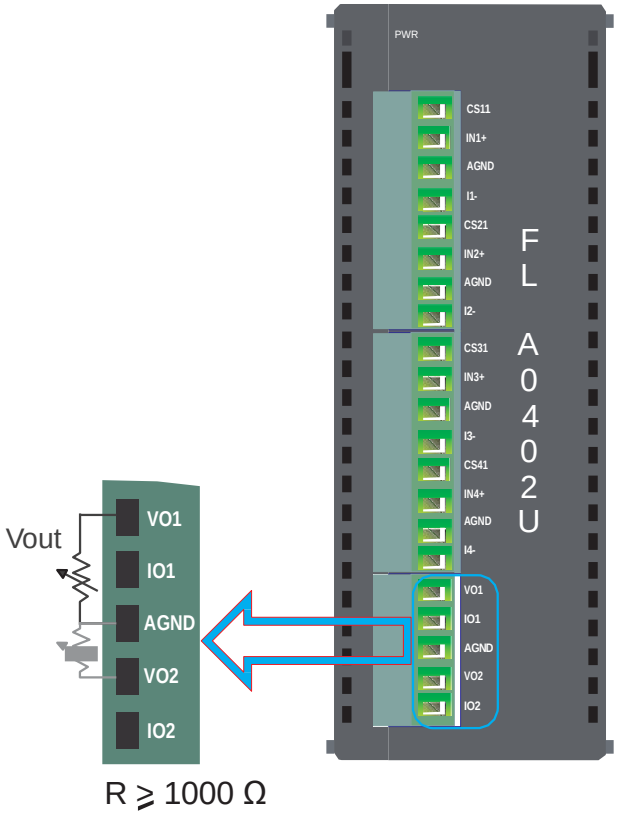


Wiring Diagram of output connection for GAA242**S:

1. Current Output Connection Diagram:



2. Voltage Output Connection Diagram:



HARDWARE

2.1 Unpacking The Unit

Carefully unpack the V200 PLC. Please read all the instructions and cautions that appear on the shipping container. Check that the container includes the Mounting DIN rail slider, locking connector, and a silica gel bag. The silica gel bag is enclosed to absorb the moisture in the packing. TIC Houston will not accept responsibility for shortages against the packing list unless notified within 30 days. The unit and its accessories were inspected and tested by TIC Houston before shipment. All equipment should be in good working order. Examine the product carefully and notify the carrier immediately if any shipping damage is evident. You are responsible for claim negotiations with the carrier. Save the shipping container and packing material in case the equipment needs to be stored, returned to TIC Houston, or transported for any reason.

2.2 Managing Electrostatic Discharge

It is recommanded NOT to remove the enclosure of the V200 PLC. When any part of the enclosure is removed, the circuitry inside is exposed to possible damage by electrostatic discharge during handling. Minimize the possibility of electrostatic discharge by:

- Dissipating static electricity of body prior to handling the V200 PLC.
- Handling the V200 PLC at a static-free grounded workstation.
- Connecting the frame ground connector of the V200 to a clean earth ground.
- Placing the V200 in an antistatic bag during transport.

2.3 CE Compliance

V200 products have been tested to confirm to European CE requirements per Council Directive. The European Union created these requirements to ensure conformity among products traded in those countries. These products are designed to withstand electrical noise in harsh industrial environment. They also confirm to requirements that limit electrical emission. However this does not guarantee the products will be totally immune from possible mal function in cases where severe electrical noise occurs. Therefore, we strongly recommend that you follow the guidelines outlined for proper wiring and grounding to ensure the proper operation.

2.4 Environmental Consideration

V200 series models are designed to operate at temperature range defined in the specification. It is intended primarily for indoor installations and may not be suitable for certain outdoor applications. Avoid installing the V200 in environments with severe mechanical vibration or shocks. Do not install the V200 in enclosures with rapid temperature variations or high humidity. Either will cause condensation of water inside the device and eventual damage to the V200 PLC.

2.5 Safety Precautions

General Information:

1. V200s has been designed and manufactured for use in an industrial environment. However, the V200 is not intended to be used for systems which may endanger human life. Consult Toshiba if you intend to use the V200 for a special application, such as transportation machines, medical apparatus, aviation and space systems, nuclear controls, submarine systems, etc.

2. The V200 has been manufactured under strict quality control. However, to keep safety of overall auto- mated system, fail-safe systems should be considered outside the V200.

3. In installation, wiring, operation and maintenance of the V200s, it is assumed that the users have general knowledge of industrial electric control systems. If this product is handled or operated improperly, electrical shock, fire or damage to this product could result.

4. This manual has been written for users who are familiar with Programmable Controllers and industrial control equipment. Contact Toshiba if you have any questions about this manual.

Hazard Classifications:

In this manual, the following two hazard classifications are used to explain the safety precautions.

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Even a precaution is classified as CAUTION, it may cause serious results depending on the situation. Observe all the safety precautions described on this manual.

CAUTION

1. Excess temperature, humidity, vibration, shocks, or dusty and corrosive gas environment can cause electrical shock, fire or malfunction. Install and use the V200 and related equipment in the environment described in this manual.

2. Improper installation directions or insufficient installation can cause fire or the units to drop. Install the V200 and related equipment in accordance with the instructions described in this manual.

3. Turn off power before installing or removing any units, modules, racks or terminal blocks. Failure to do so can cause electrical shock or damage to the V200 and related equipment.

4. Entering wire scraps or other foreign debris into to the V200 and related equipment can cause fire or malfunction. Pay attention to prevent entering them into the V200 and related equipment during installation and wiring.

5. Turn off power immediately if the V200 or related equipment is emitting smoke or odor. Operation under such situation can cause fire or electrical shock. Also unauthorized repairing will cause fire or serious accidents. Do not attempt to repair. Contact Toshiba for repair or replacement.

Wiring:

CAUTION

1. Turn off power before wiring to minimize the risk of electrical shock.

2. Exposed conductive parts of wire can cause electrical shock. Use crimp-style terminals with insulating sheath or insulating tape to cover the conductive parts. Also close the terminal covers securely on the terminal blocks when wiring has been completed.

3. Operation without grounding may cause electrical shock or malfunction. Connect the ground terminal on the V200s to the system ground.

4. Applying excess power voltage to the V200 can cause explosion or fire. Apply power of the specified ratings described in the manual.

5. Improper wiring can cause fire, electrical shock or malfunction. Observe local regulations on wiring and grounding.

2.6 Installation Instructions

The V200s should be mounted on a din rail plate. A din rail sliders and locking connectors are provided with each V200 unit for proper installation.

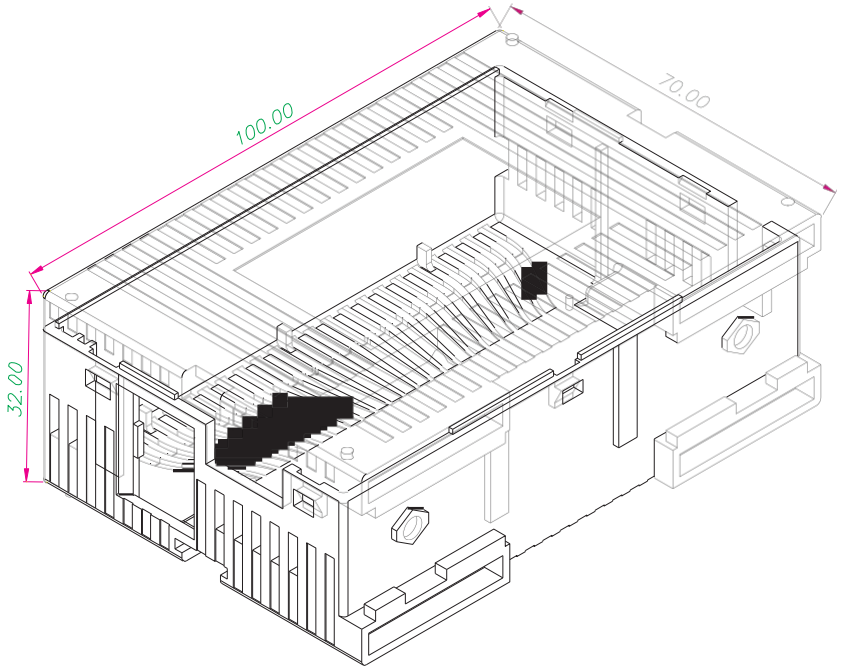
Environmental Considerations:
Make sure that the unit is installed correctly and that the operating limits are followed (see Specifications for V200). Do not operate the V200 in areas subject to explosion hazards due to flammable gases, vapors or dusts. A V200 should not be installed where fast temperature variations are present. Highly humid areas are also to be avoided. High humidity causes condensation of water in the unit.

Location Considerations:
Care should be taken when locating equipment behind the V200 to ensure that AC power wiring, PLC output modules, contactors, starters, relays and any other source of electrical interference are located away from the V200. Particular care should be taken to locate variable speed drives and switching power supplies away from the V200.

Panel Mounting
This section presents the dimensional sketches and din rail sliding for V200 (V200) models. (All dimensions are in mm and drawing are not to scale.)

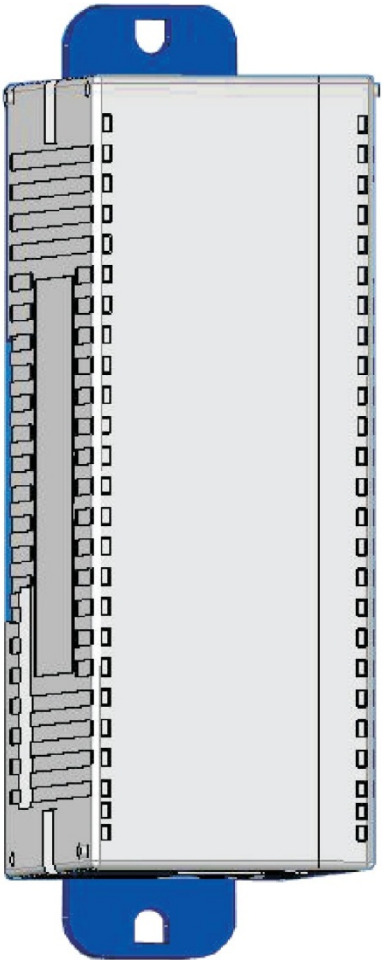
V200 PLCs are shipped with a DIN rail slider & locking connector attached to the unit. User can use the unit with or without DIN rail slider.

Dimensional Details:

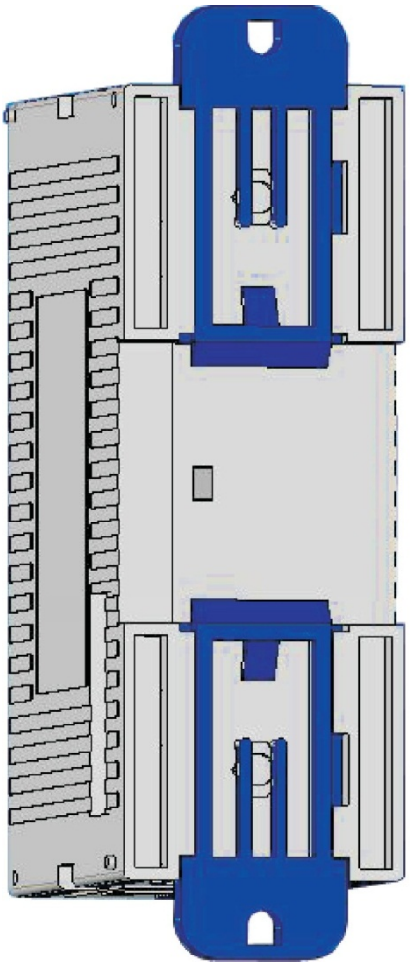


V200 PLC with DIN rail slider

Front View



Rear View



Steps to mount the unit on DIN rail plate

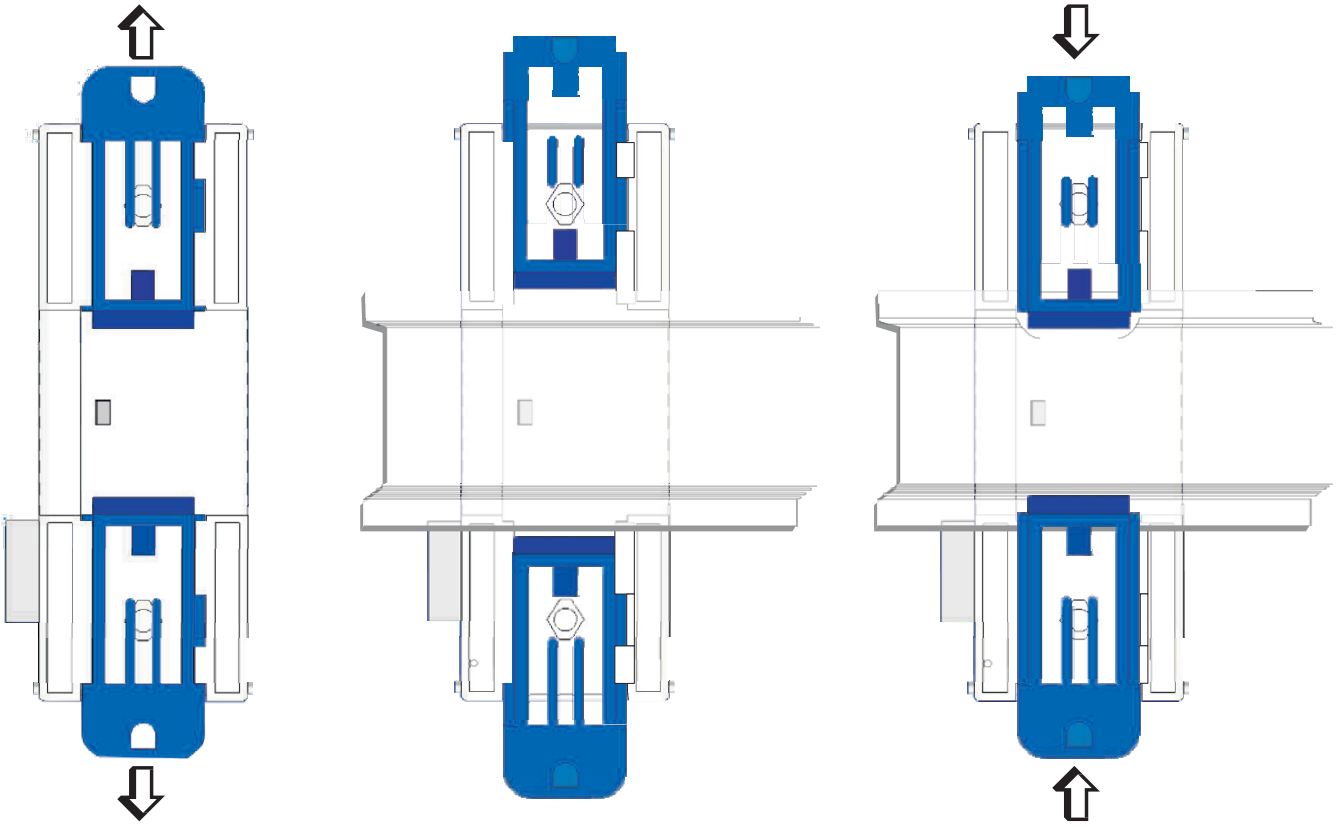


FIG-1 FIG-2 FIG-3

FIG-1 Pull up the sliders provided with the V200 towards outward direction. FIG-2 Rest the unit on the DIN rail plate

FIG-3 Pull down the slider again so that unit can fix up with the DIN rail plate

Steps to lock the expansion module with the base V200

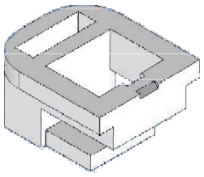


FIG-1

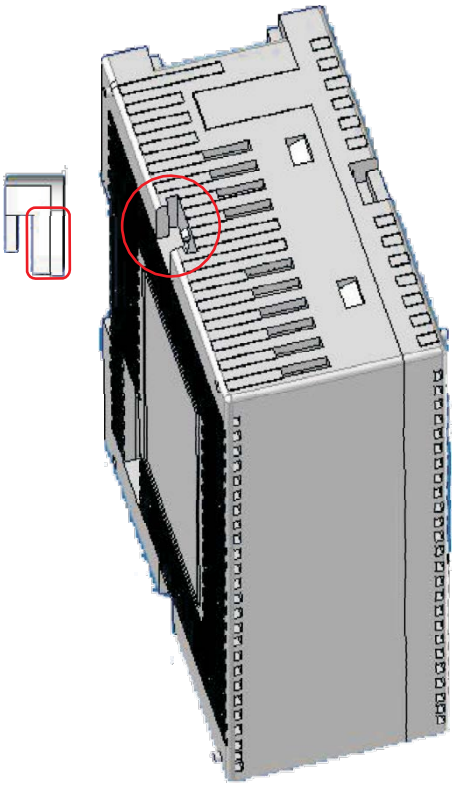


FIG-2

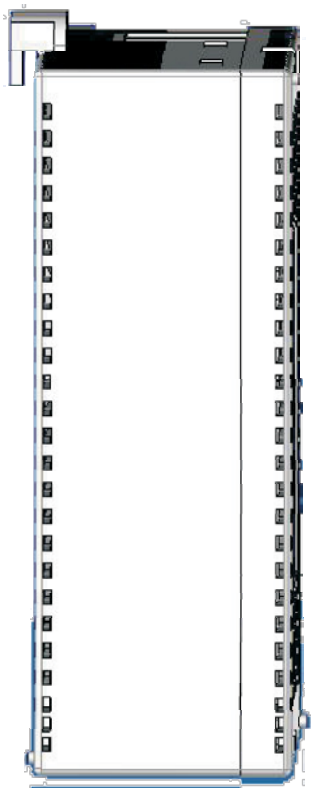


FIG-3

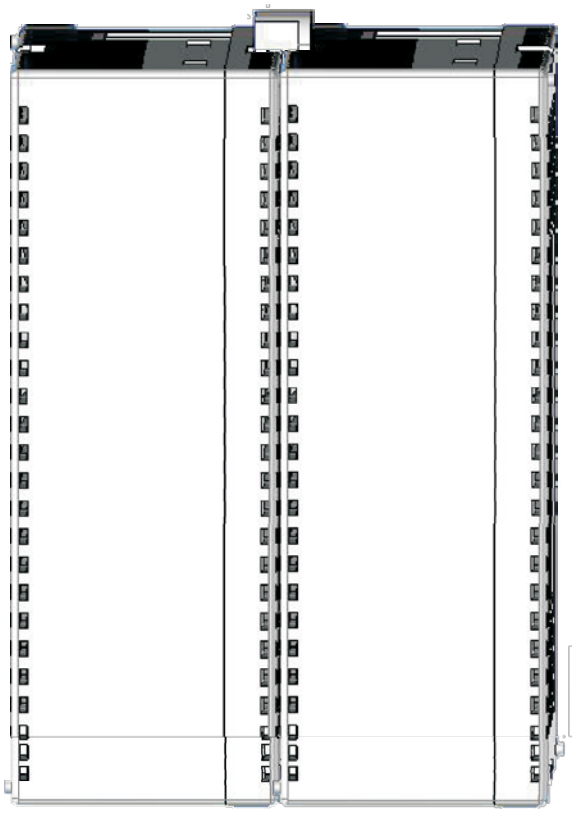


FIG-4

FIG-1 Lock connector provided with V200 PLC

FIG-2 Two slots to grip the locking connector are provided on the case highlighted by RED circle. Insert a big leg of locking connector highlighted by RED rectangle.

FIG-3 Single V200 PLC with locking connector

FIG-4 Locking connector helps the two units (V200 base &/or V200 expansion) to hold each-other properly on the DIN rail plate along with DIN rail slider.

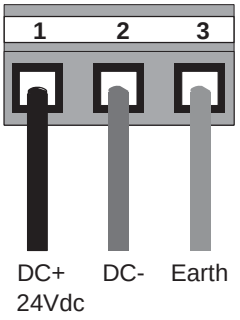
Note: Apart from these lockings, also expansion connector is present to each V200 PLC. User can connect V200 base to expansion unit using this connector. Also user can
add more expansions to the unit with this connector only.

2.7 Wiring Diagram

If wiring is to be exposed to lightening or surges, use appropriate surge suppression devices. Keep AC, high energy and rapidly switching DC wiring separate from signal wires.

Connecting high voltages or AC power mains to the DC input will make unit unusable and may create an electrical shock hazard to personnel. Such a failure or shock could result in serious personal injury, loss of life and/or equipment damage. DC voltage sources should provide proper isolation from main AC power and similar hazards.

Pin description of the power connector for base models is as follows:



2.8 Communication Ports

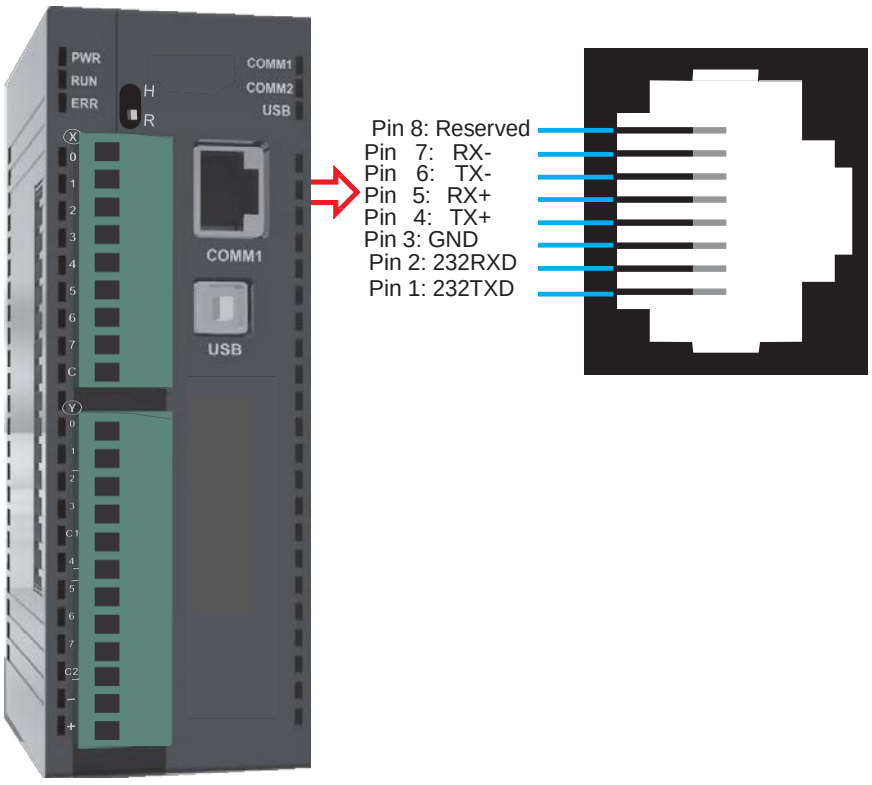
V200 communication ports support three types of serial communication.

They have two communication Ports in which COM1 is multi-signal port. Multi-Signal means COM1 port has RS232, RS422, and RS485 signal levels.

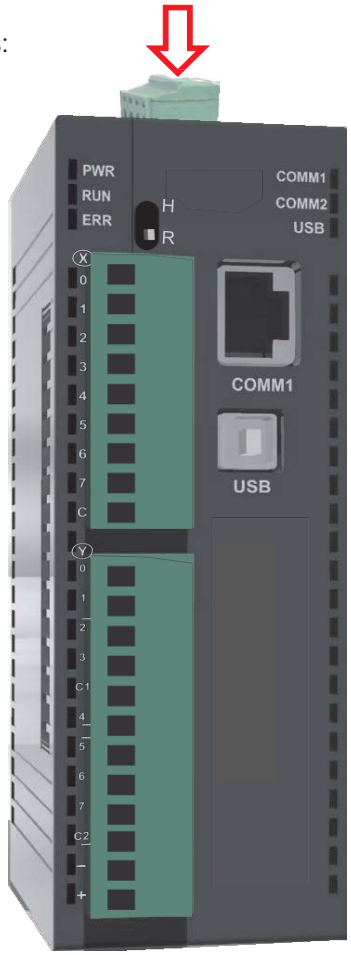
A V200 can simultaneously communicate on both serial ports. The V200 can be programmed from a PC on either port. Both ports can also be used with a serial printer.

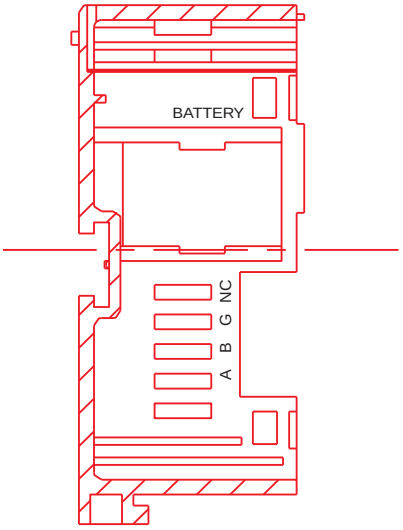
Different cables are required to connect the V200 to a specific PLC. Cable details for any particular device are given in the Operation Manual. The pin description of the communication ports for V200 model is as given below:

1. COM1 Port Details:



2. COM2 Port Details:





USB Device:

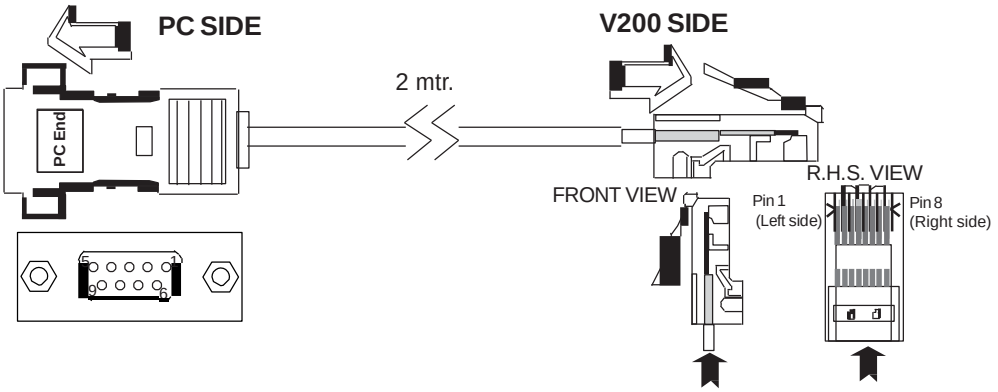
1. USB Device, compliant with USB 2.0 specification, self powered device.
2. Connector used: Standard USB Type B Female connector.

Ethernet:

1. Fully compliant with IEEE 802.3 / 802.3u standards.
2. 10/100 Mbps support.
3. Connector used: Standard shielded RJ-45 female jack with in-built speed and link activity indication LEDs.

2.9 Communication Cables

Programming cable for V200 PLCs (IBM-H-005-00):



DB9 FEMALE PINOUTS

Signals	Pin#
	1
RXD	2
TXD	3
	4
SG & Shield	5
	6
	7
	8
	9

8 PIN MODULAR CONNECTOR PINOUTS

Pin#	Signals
1	TXD
2	RXD
3	SG & Shield
4	
5	
6	
7	
8	
9	

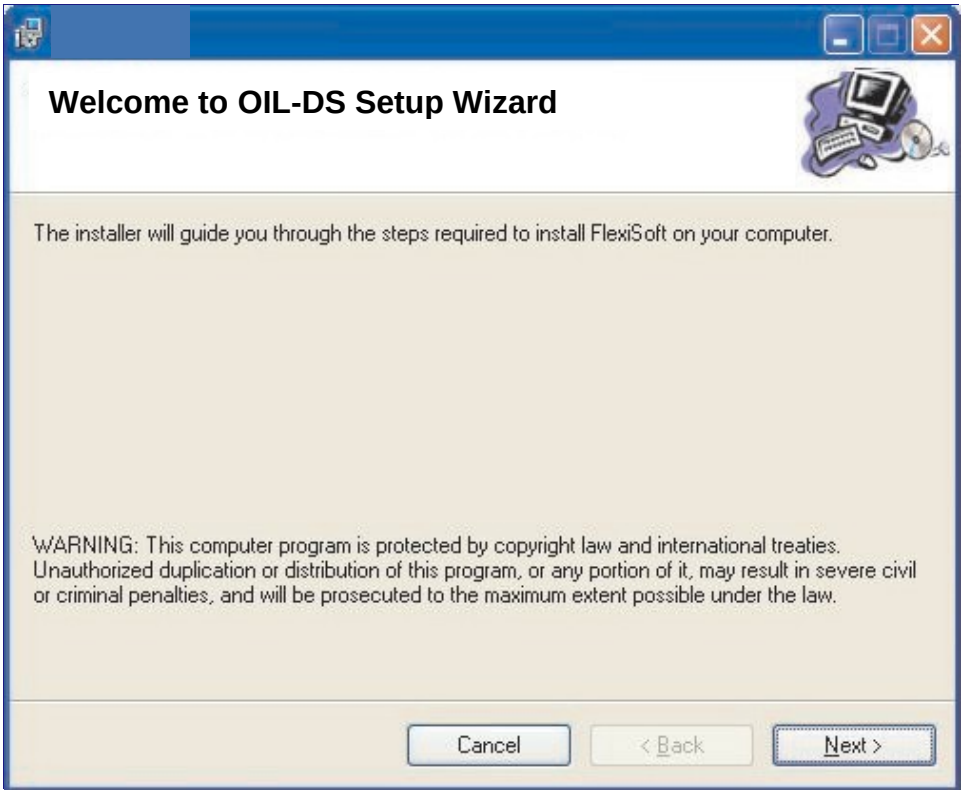
BEFORE YOU BEGIN

- Installing OIL-DS Configuration Software
- Starting OIL-DS Configuration Software
- Uninstalling OIL-DS Configuration Software
- Launching Ladder Editor
- Creating Sample Ladder Application

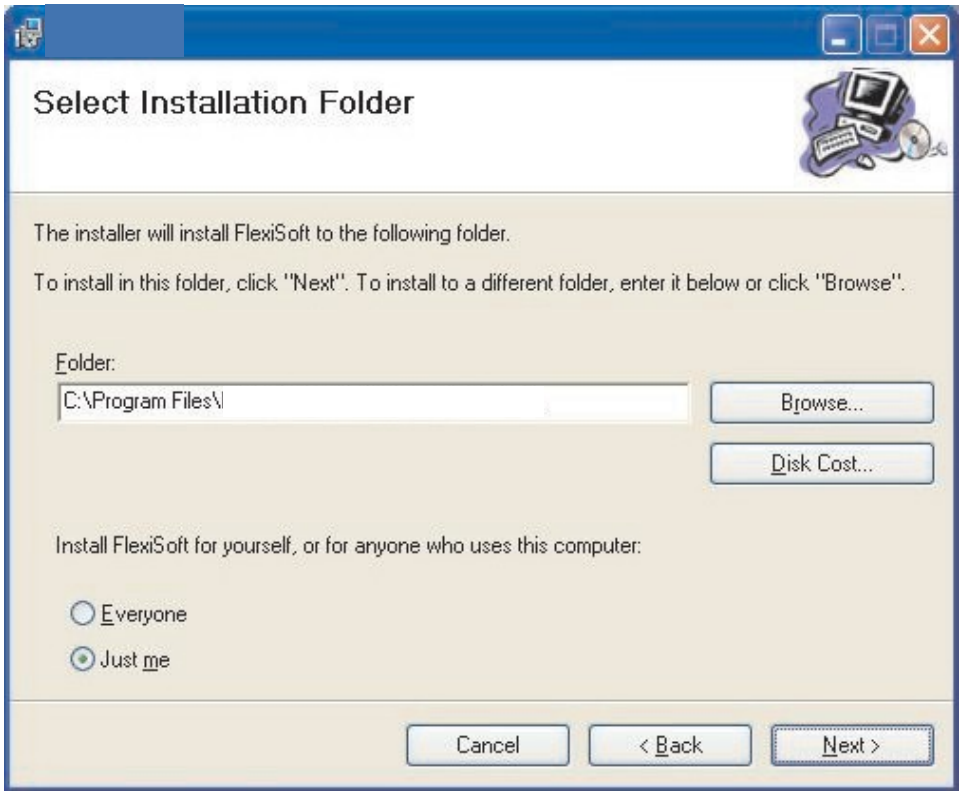
3.1 Installing OIL-DS Configuration Software:

To install OIL-DS configuration Software:

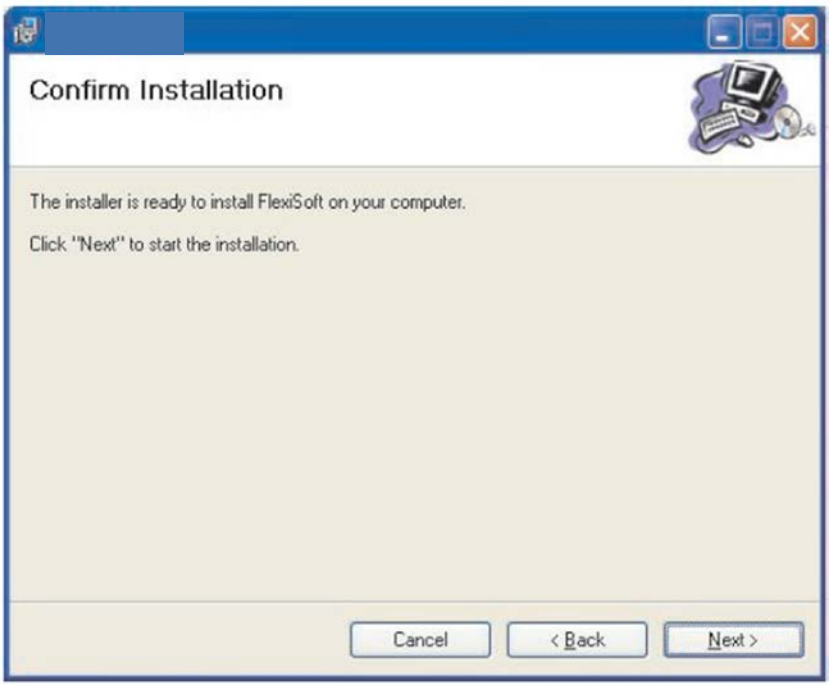
1. Open Microsoft® Windows.
2. Select Run and Pop up window appears. Type the path for installing the Setup. This will install OIL-DS Configuration Setup Software.
3. When you click on OK, Welcome window appears on the screen. Click on Next.

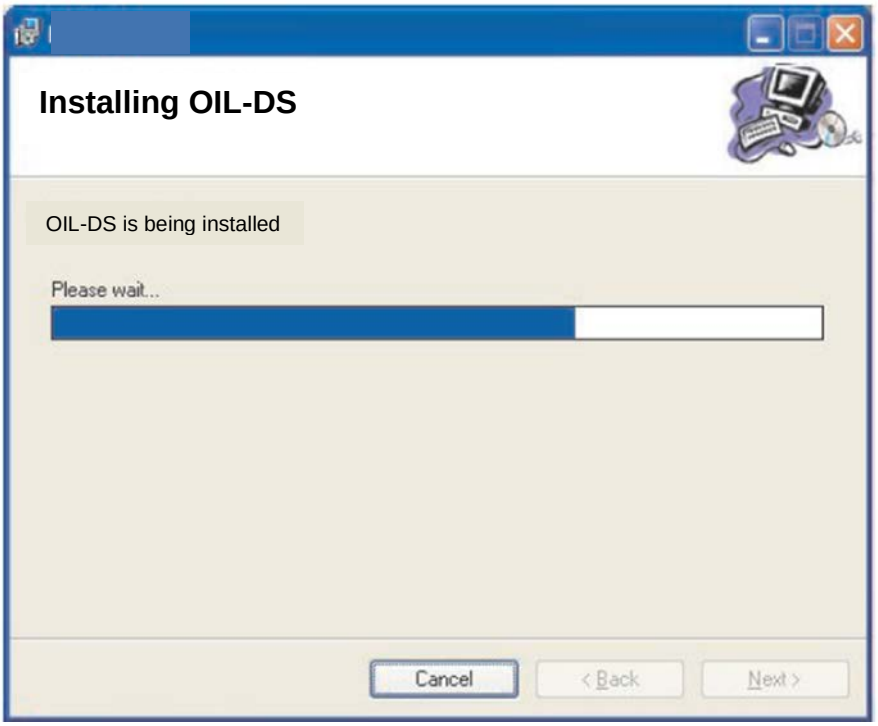


4. Select the destination folder where setup will install the files.

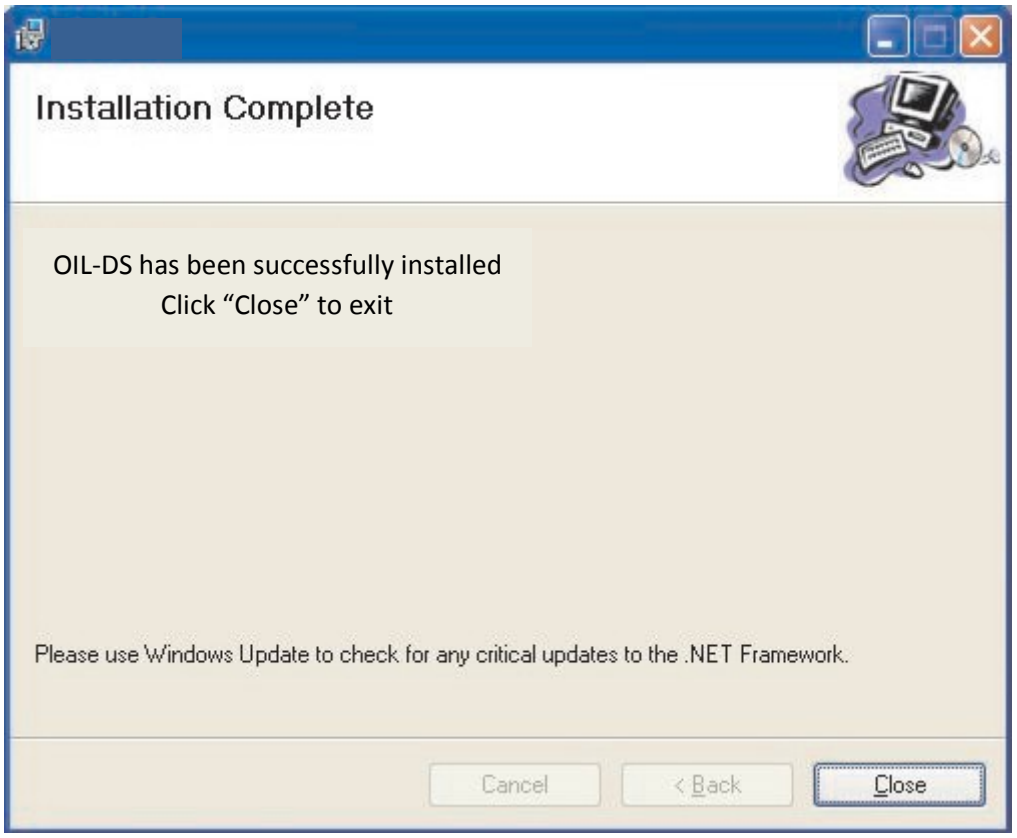


5. Click on "NEXT", installation starts. A dialog box indicating the status of progress of installation will display.





6. A screen is displayed to inform you when installation is completed.



This procedure installs OIL-DS Software in start menu (in selected folder).

3.2 Steps for starting OIL-DS Software

1. Click the Start button in Windows OS.
2. Select Programs.
3. Select “OIL-DS”.
4. Select OIL-DS setup exe.
5. Select New Application either from Tool station or from File Menu.
6. Select the model and product type that you would like to set by clicking on picture of the product in the list.
7. Define the Unit Settings.
8. Next step is to define Tag Database to your application.

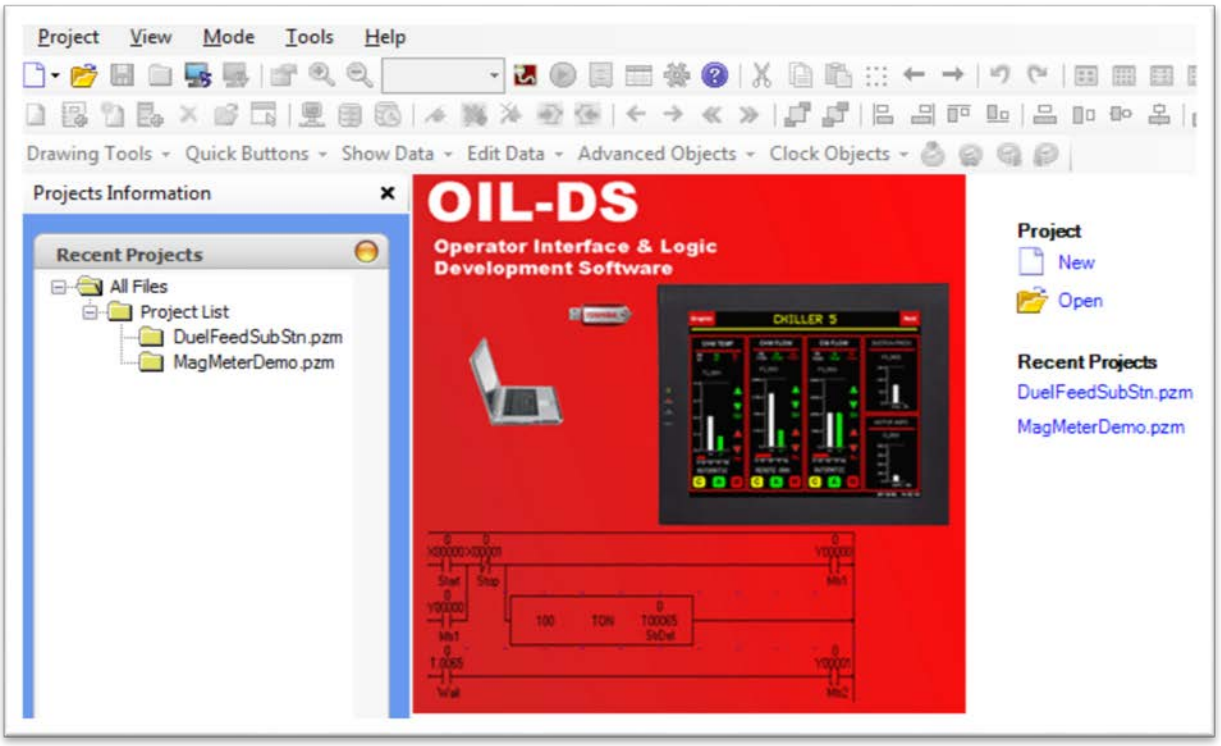
3.3 Uninstalling OIL-DS Software

1. In Windows click the Start button.
2. Select Programs.
3. Select OIL-DS.
4. Select Uninstall OIL-DS.

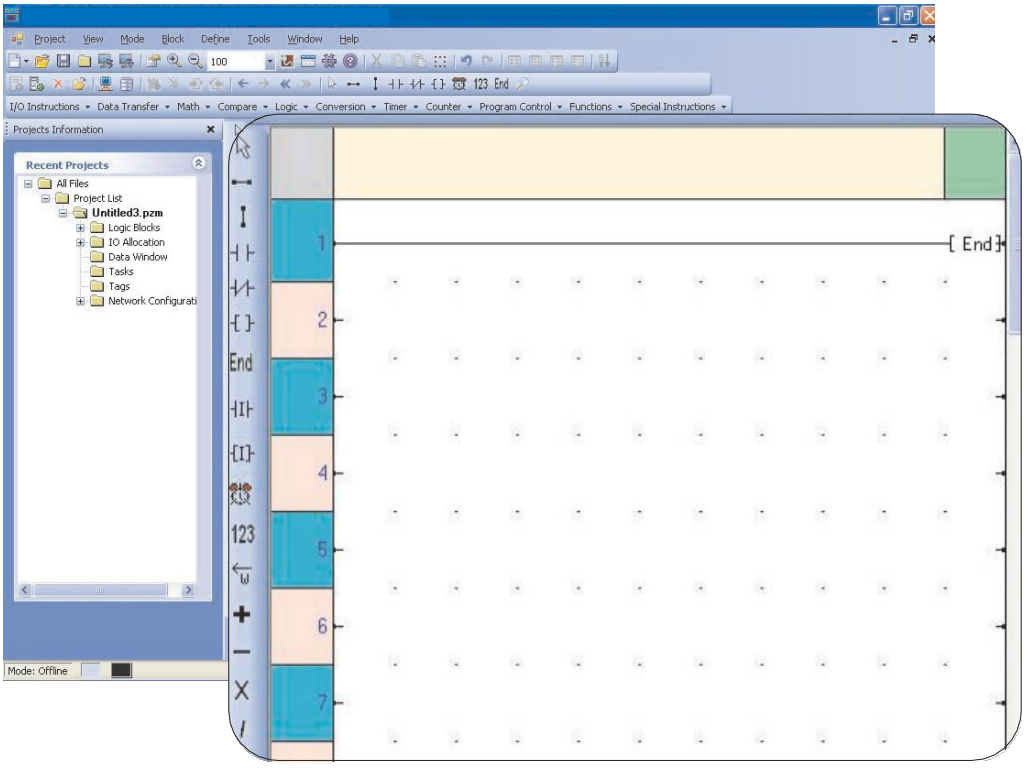
Following screen will display. The screen will ask you for the confirmation for uninstalling OIL-DS configuration software.

3.4 Launching Ladder Editor in OIL-DS

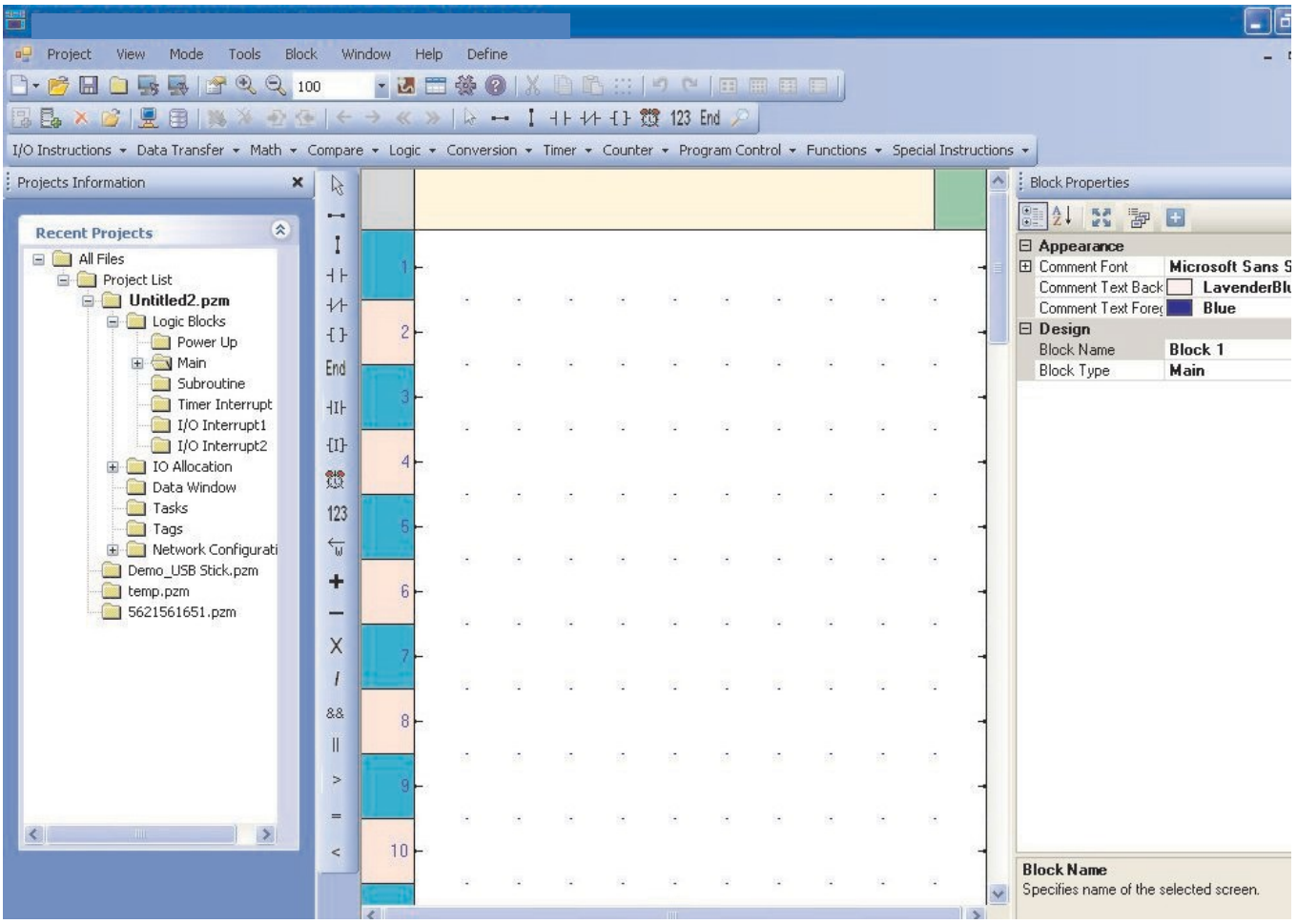
Launch OIL-DS setup software on your PC. Below shown welcome screen will display.



To launch a ladder application either choose Project -> New option or click on New application icon.
Choose V200 PLC and define “Project Configuration” window with the information required.
Click “OK”.
This will launch ladder editor to create an application as shown:



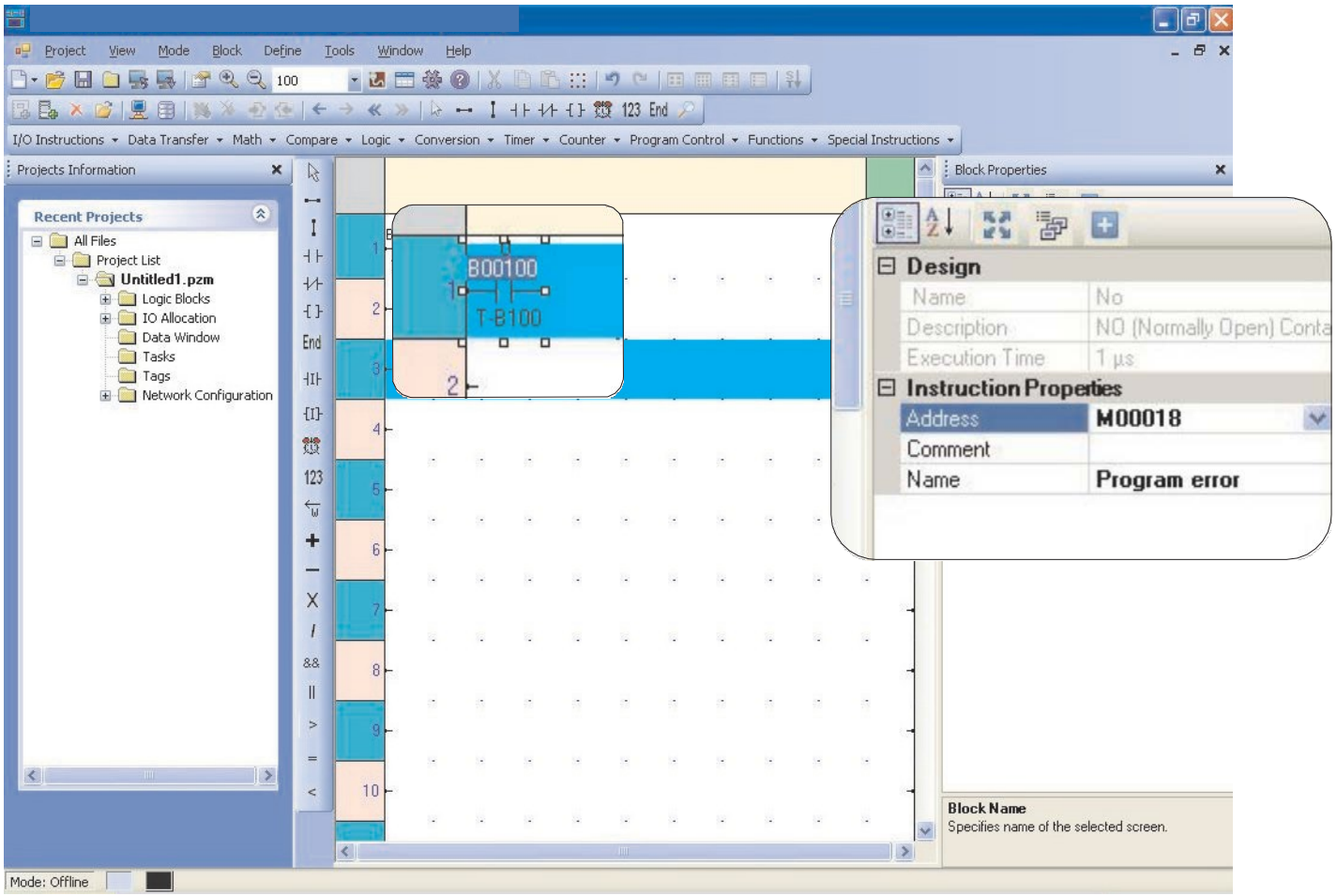
A ladder Text Editor appears as shown below:



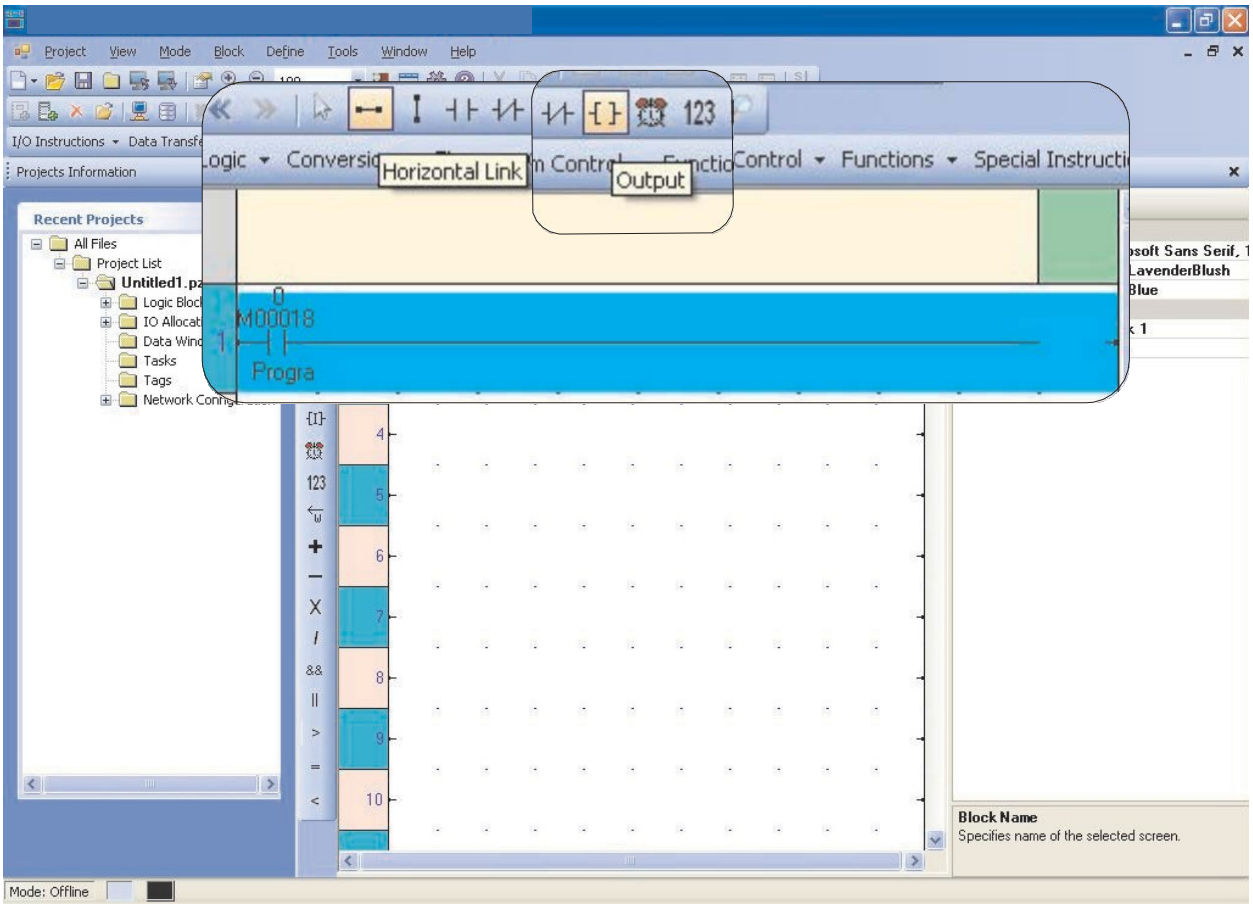
Now here you can create your ladder

3.5 Creating Sample Ladder

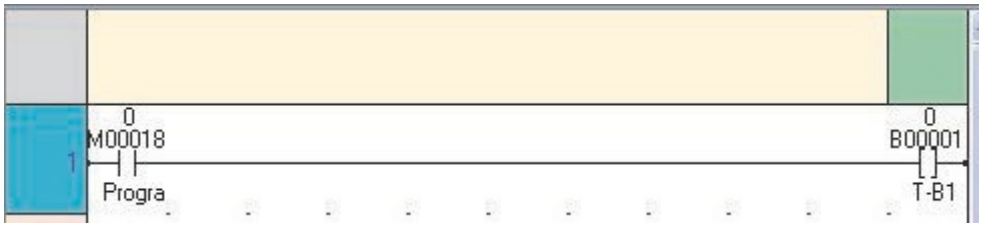
After launching Ladder Text Editor, you can create a ladder here. Steps are shown below:
Step-1:



Here in the example, “NO” instruction is taken. Define its address and name from the “Instruction Properties” window seen to the left side of the application window. as shown in the above figure.

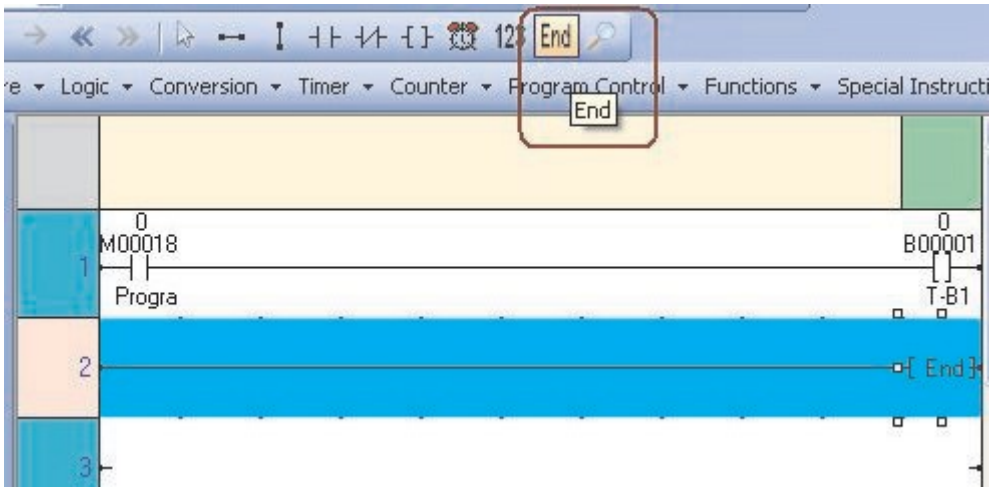


Complete the rail using “Horizontal Link” command, then put “Output” command.
User can also directly put “Output” link to the last right side point of the rail. This will complete the command. as shown below:



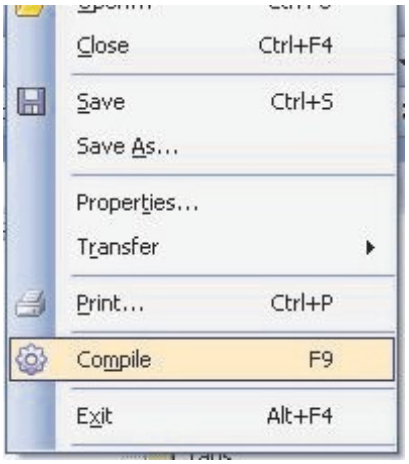
For output command also, define tag address and name from the “Instruction Properties” window seen to the right side of the application window.

Put “End” instruction as shown below:

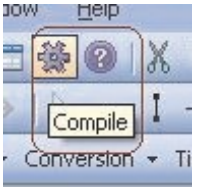


Note: Do not forget to put “END” command whenever ladder application is over.

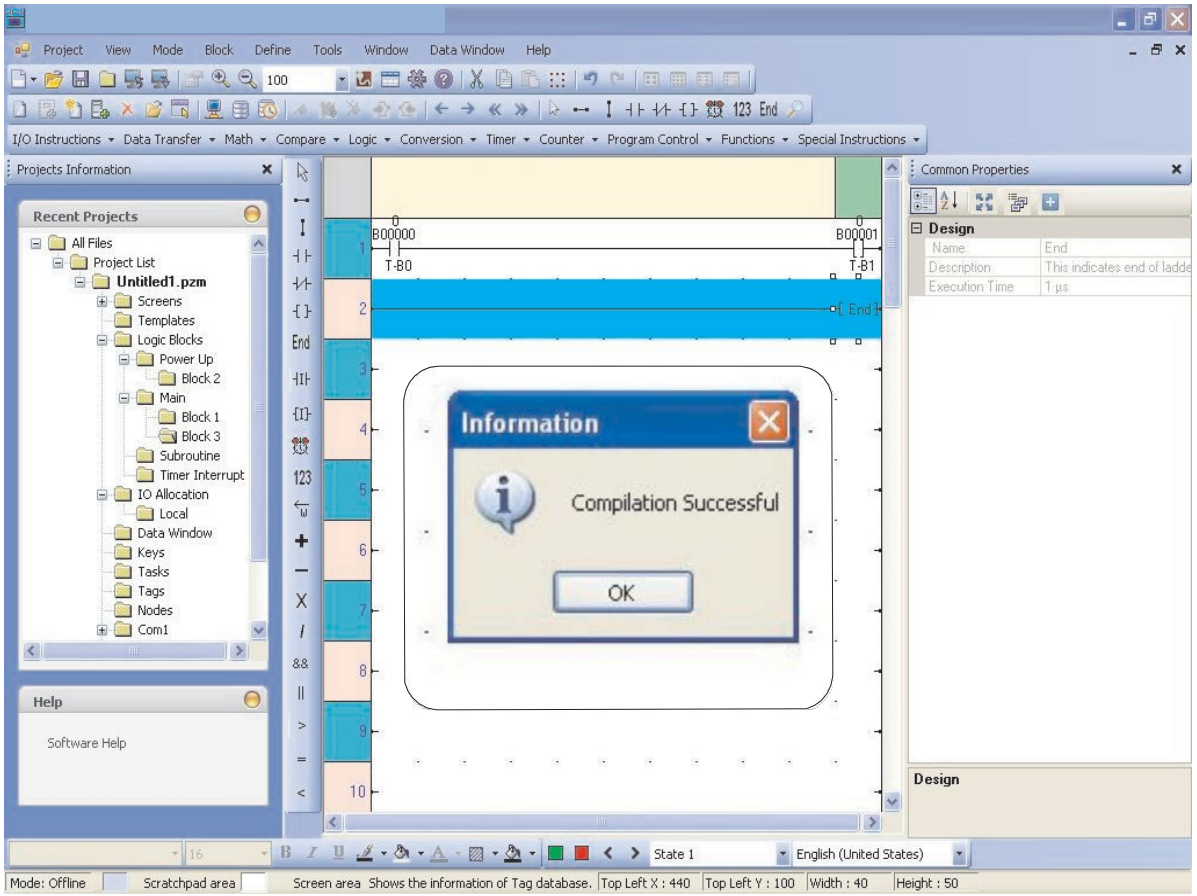
After completing ladder, Compile it as shown below:



Or



Following screen will appears if compilation is successful.



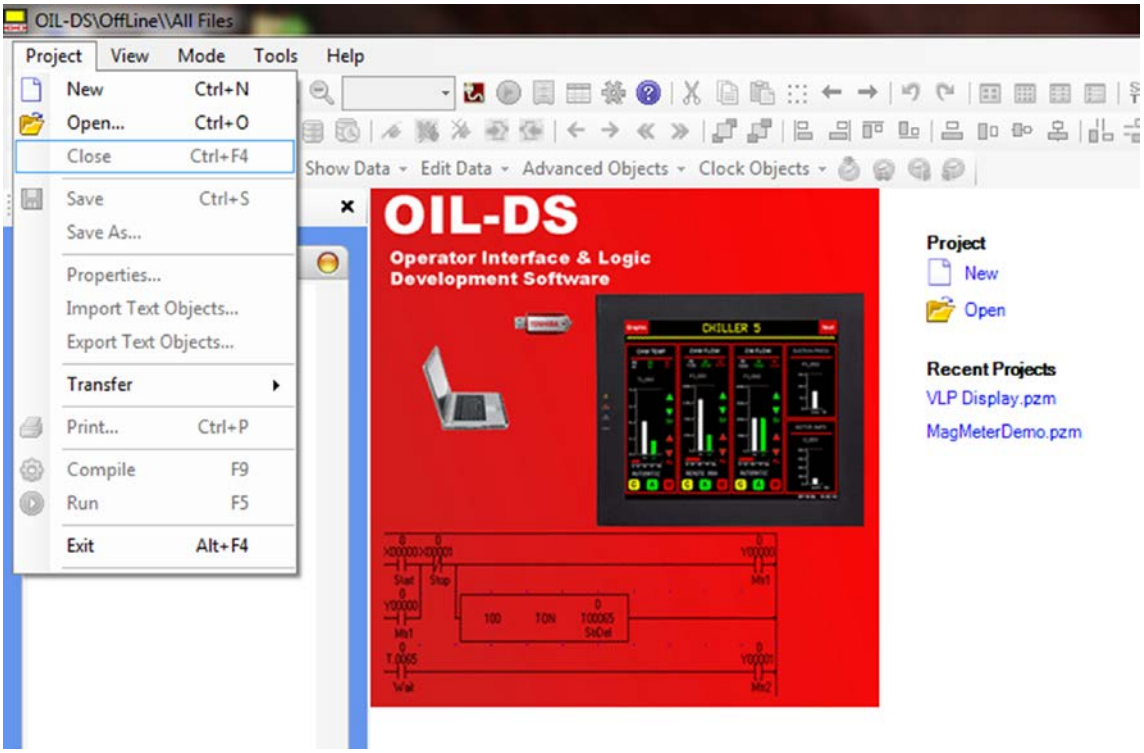
CONFIGURATION

- Configuring V200 with OIL-DS
- Tag Database
- Register Memory Allocation

4.1 Configuring V200 using OIL-DS

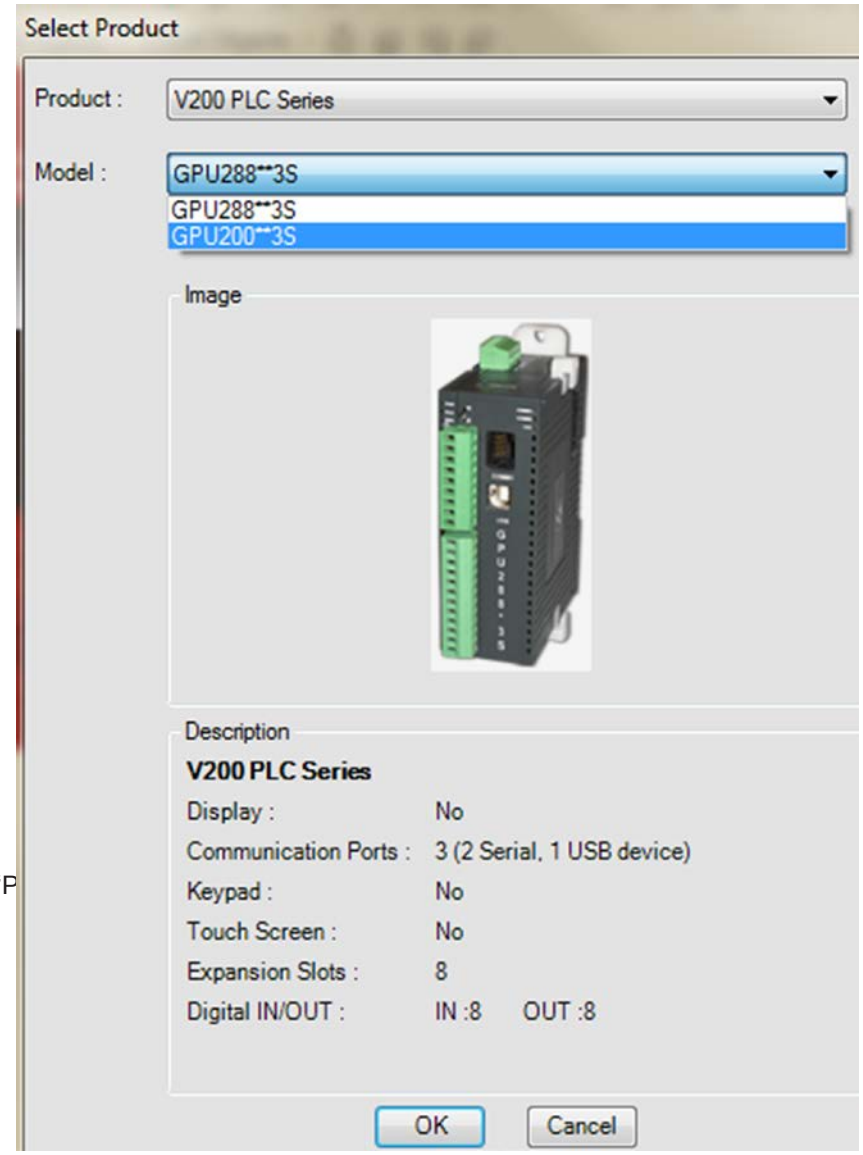
Before creating any application or connecting V200 CPU to any system, it must be configured using OIL-DS.

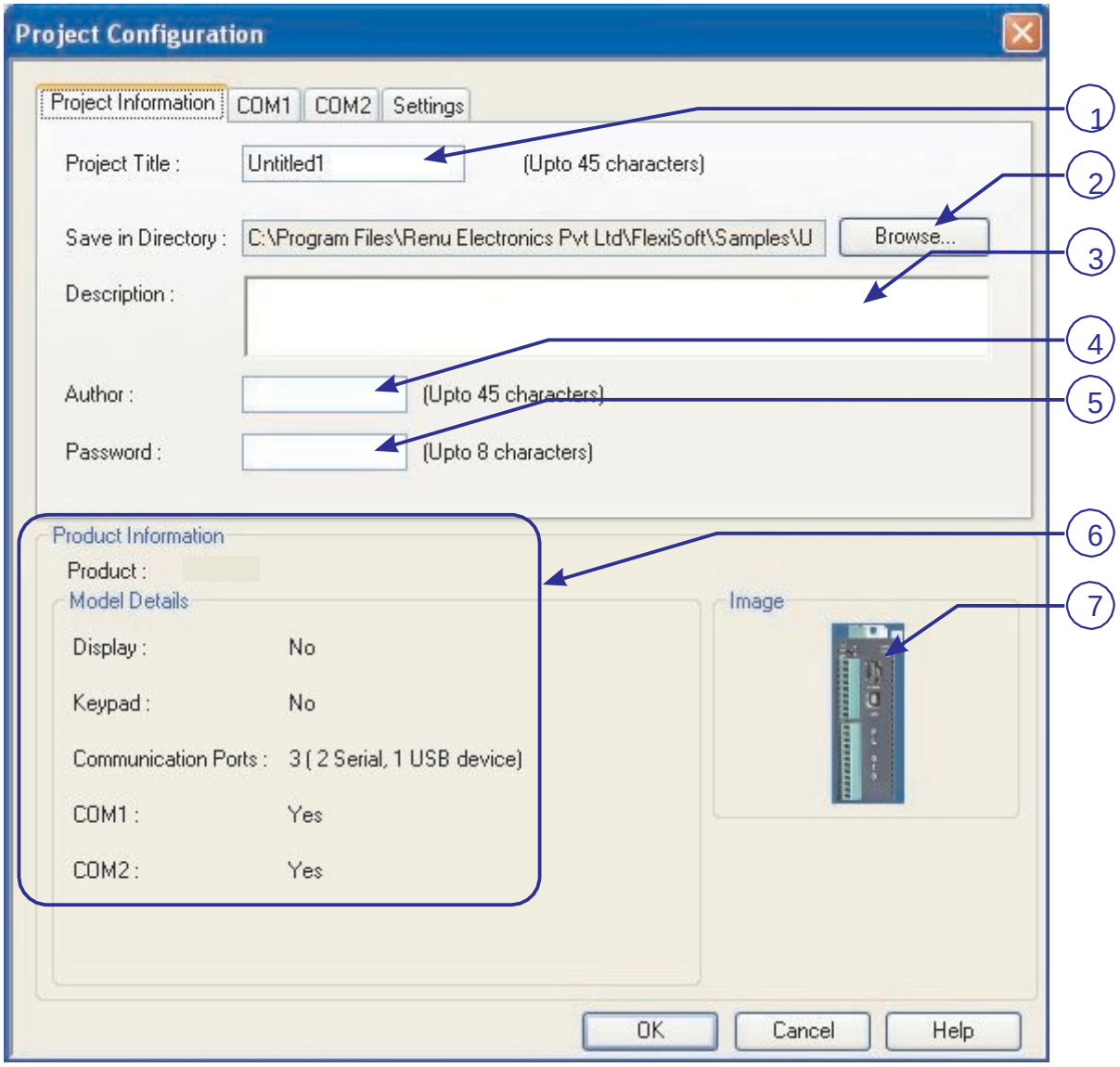
1. Connect the unit to the PC.
2. Power-On the unit.
3. Launch OIL-DS software. “Welcome” screen will appear. Press “New” from the application window or Project -> New as shown below:



4. This will launch “Select Product” window as shown below. Select the product and the model from the listing.

5. Press “OK”. “P


Select Product
Product :
V200 PLC Series
Model :
GPU288**3S
GPU288**3S
GPU200**3S
Image
Description
V200 PLC Series
Display : No
Communication Ports : 3 (2 Serial, 1 USB device)
Keypad : No
Touch Screen : No
Expansion Slots : 8
Digital IN/OUT : IN :8 OUT :8
OK
Cancel



In this dialoge box section:
Point 1: You can define project name or can keep “Untitle” as default.
Point 2: You can define path for the project to be saved.
Point 3: You can mention any special note; if required.
Point 4: You can define author name.
Point 5: You can define “password” for the project you created.
Point 6: You can see the information of the model selected.
Point 7: You can see the image of the model you selected.
Note: Point 6 and 7 will appear with all tabs of “Project Configuration” docker.

3. Press “OK” button.

You can see a application window listing information as Logic blocks, tasks, tags and Network Configuration.

After setting macro level parameters from these project items, your application is ready for downloading.

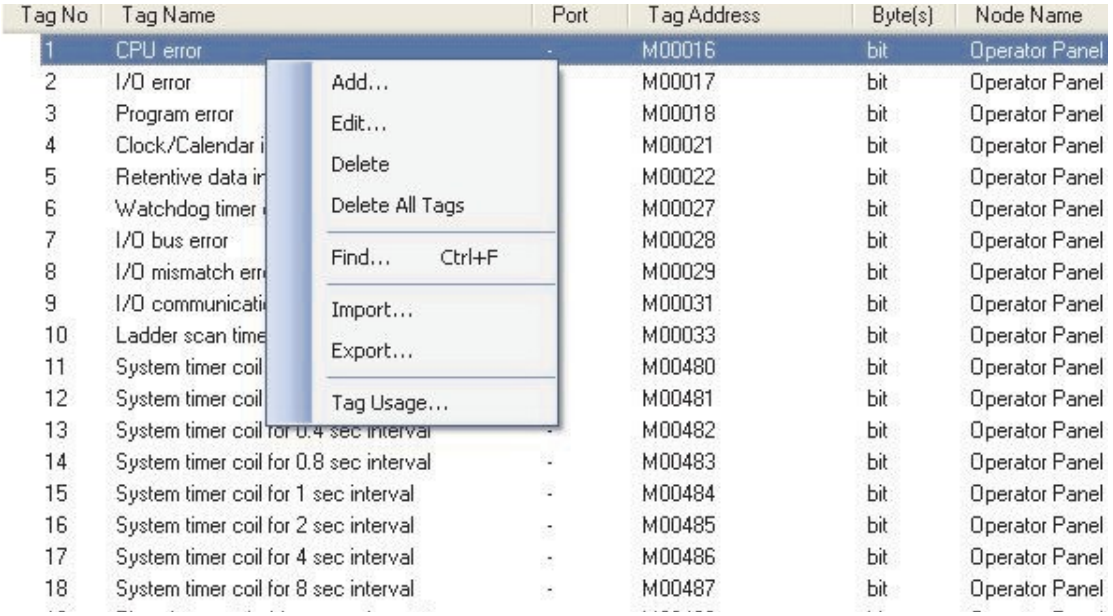
4.2 Tag Database

This is the central database for the tags that need to be used in the application. Once the tags are defined (as register or coils) and their attributes selected, the tags can be used in the application, tasks, etc. This screen helps you to define Tags associated with defined Nodes. A tag is a register, coil or an individual bit of a register. Select the type of tag from the Tag Type field.

If the type of tag selected is a register then the number of bytes required can also be selected. For editing a floating point data number, the number of bytes must be 4. The Tag Name field is user definable. A tag is not added to the tag list unless a tag name is defined. Once these fields are defined, click on the Add button. The Block field in the tag database defines the starting address of the tag block followed by the block size.

For example : Tag M0214 is within a block (M0214 : 1) whose starting address is M0214 and block size is 1.

This block size is optimized automatically depending on the address of PLC Tag.
Default block size is either 1 or 16. This setting varies from PLC to PLC.
The attributes of existing tag can be changed by highlighting the tag, making the changes, and clicking the Change Tag button. An existing tag can be removed from tag list by clicking on Delete Tag button. Note that removal of tags is possible only if they are not used in any application.



Add - Use this button to add a tag. After clicking this button, the user has to define the following:
1. Node : Where the tag is located.
2. Register, coil or a bit within a register. Registers can be read only or read/write.
3. The address limits are shown and vary from PLC model to model.
4. Tag name : Each tag needs to have a unique name. The name can be up to 40 characters in length.
5. Byte(s) : If the selected tag is a register, the tag can be defined as a 1 byte (either high or low byte), a 2 byte, or a 4 byte tag.

Edit – Select the tag. Edit the information and then click on the Update button.

Delete - Select the tag and click on Delete button to delete the tag. Before deleting any tag, the user must delete any references to the tag in tasks. Otherwise it cannot be deleted.

Default System Tags

Note: Please do not attempt to modify read only system tags in the ladder. This could affect the functionality of the product.

System Registers / Coils:

Register / Coil	Tag Name	Read / Write	Description
SW0003_14	COM1 Status	Read Only	0 = Communication Error; 1= Communicating with PLC
SW0003_15	COM2 Status	Read Only	0 = Communication Error; 1= Communicating with PLC
S0000	Carry Bit	Read/Write	Overflow indication in math operations of ladder and also used in rotate with carry instruction.
SW0010	RTC Day of Month	Read only	RTC day in integer format
SW0011	RTC Month	Read only	RTC month in integer format
SW0012	RTC Year	Read only	RTC year in integer format
SW0013	RTC Hour	Read only	RTC hour in integer format
SW0014	RTC Min	Read only	RTC minute in integer format
SW0015	RTC Sec	Read only	RTC sec in integer format
SW0016	RTC Day of Week	Read only	RTC day of week in integer format
SW0017	Scan time register	Read only	Value is in multiple of 0.1 mSec. This includes execution time for reading inputs, executing tasks, executing ladder, update outputs, etc. (Refer flow chart)
S0019	Invalid RTC date entry	Read only	0=valid date 1= Invalid date
SW0018	COM1 failed node reconnect time (Sec)	Read/write	Shows time in sec recover the communication with failed nodes for port1.the default value is 60Sec
SW0019	COM2 failed node reconnect time (Sec)	Read/write	Shows time in sec recover the communication with failed nodes for port1.the default value is 60Sec
SW022	COM3 failed node reconnect time (Sec)	Read/write	Shows time in sec recover the communication with failed nodes for port3.the default value is 60Sec
S0021	COM1 failed node reconnect control	Read/write	If this bit is set communication with the failed nodes is detected after scan time SW0018 for port1.By default : ON
S0022	COM2 failed node reconnect control	Read/write	If this bit is set communication with the failed nodes is detected after scan time SW0019 for port2.By default : ON
S0023	COM3 failed node reconnect control	Read/write	If this bit is set communication with the failed nodes is detected after scan time SW0022 for port3.By default : ON
SW64-SW65	Node Status Registers for COM1	Read only	Shows the status of the node, whether node is present or not. Total 2 word Register are mapped for 32 nodes.
SW80-SW81	Node Status Registers for	Read only	Shows the status of the node, whether node is COM2 present or not. Total 2 word Register are mapped for 32 nodes.
SW96-SW111	Node Status Registers for	Read only COM3	Shows the status of the node, whether node is present or not. Total 16 word Register are mapped for 256 nodes. (Not applicable for non-Ethernet models)

SW046	Ladder Scan Time	Read only	Value is multiple of 0.1 mSec
S0034	Ladder Instruction Error Status	Read/Write	Set if Division by zero operation is performed in the ladder instruction and for invalid conditions or operands in case of conversion instructions.

Configuration Words and coils

Register / Coil	Tag Name	Read / Write	Description
MW0000	PLC Operation Mode (Bit 0 to Bit 3)	Read/Write	Bit0-3: 0: Initialization 1: HALT Mode 2: RUN Mode 3: RUN-F Mode 4: HOLD Mode 6: ERROR Mode.
MW0001	Error Register 1	Read Only	Refer mapped coils M16 to M31
MW0002	Error Register 2	Read Only	Refer mapped coils M32 to M47
MW0003	RUN/STOP Switch Control (Retentive)	Read Only	1: HALT, 0: RUN. Only LSB is used. other bits (1 to 15) are not used.
MW0005	Digital Filter constant	Read/Write	Enabled when MW10 bit 16 is ON. (0 to 15 mS)
MW0010	Configuration Register for Special inputs	Read/Write	Refer Special input - output section
MW0011	Configuration Register for PWM output	Read/Write	Refer Special input - output section
MW0012	Preset values for high Speed Counter	Read/Write	Used to set the preset values for high speed counter
MW0013			
MW0014			
MW0015			
MW0016	Count Values for high Speed Counter	Read/Write	Preset count values of the high speed counters are stored
MW0017			
MW0018			
MW0019			
MW0020	High Speed counter control flags	Read/Write	Control flags for high speed counters
MW0021	Special output control flags	Read/Write	Refer Special input - output section
MW0022	Special Output Control Flags	Read/Write	Control flags for high speed counters
MW0023			
MW0024	Special output Frequency Setting	Read/Write	Refer Special input - output section
MW0025			
MW0030	System Timer Coils	Read Only	Refer mapped coils M00480 to M00487
MW0031	User Interrupt program Status Flags	Read Only	Bit 0 for timer ,Bit 1 for IO1, Bit 2 for IO2. Refer mapped coils M496,M497 & M498 when MW10 bit 16 is ON.
MW0033	Unit IP Address Lo Word	Read Only	Used for Ethernet Model
MW0034	Unit IP Address Hi Word	Read Only	
MW0035	Unit Subnet Mask Address Lo Word	Read Only	
MW0036	Unit Subnet Mask Address Hi Word	Read Only	
MW0037	Unit Default Gateway Lo Word	Read Only	
MW0038	Unit Default Gateway Hi Word	Read Only	
M00016	CPU error	Read Only	ON at error state
M00017	I/O error	Read Only	ON at error state
M00018	Program error	Read Only	ON at error state. This group includes Ladder Scan time.

M00021	Clock/calendar illegal value warning	Read Only	ON when clock/calendar data is illegal
M00022	Retentive data invalid warning	Read Only	ON when retentive data in RAM are invalid
M00027	Watchdog timer error	Read Only	ON at error state
M00029	I/O mismatch error	Read Only	ON at error state
M00031	I/O communication error	Read Only	ON at error state
M00033	Ladder Scan time error	Read Only	ON when the scan time exceeds 200ms (default)
M00480	System timer coil for 0.1 sec interval	Read Only	Toggle at 50 % duty cycle
M00481	System timer coil for 0.2 sec interval	Read Only	Toggle at 50 % duty cycle
M00482	System timer coil for 0.4 sec interval	Read Only	Toggle at 50 % duty cycle
M00483	System timer coil for 0.8 sec interval	Read Only	Toggle at 50 % duty cycle
M00484	System timer coil for 1 sec interval	Read Only	Toggle at 50 % duty cycle
M00485	System timer coil for 2 sec interval	Read Only	Toggle at 50 % duty cycle
M00486	System timer coil for 4 sec interval	Read Only	Toggle at 50 % duty cycle
M00487	System timer coil for 8 sec interval	Read Only	Toggle at 50 % duty cycle
M00496	Timer interrupt ladder execution status	Read Only	ON when Timer program is executing
M00497	IO1 interrupt execution status	Read Only	ON when IO1 program is executing
M00498	IO2 interrupt execution status	Read Only	ON when IO2 program is executing
M00512	ALWAYS ON	Read Only	This coil is always ON
M00513	ALWAYS OFF	Read Only	This coil is always OFF

4.3 Input (XW), Output (YW) and Configuration (MW) Register Allocation

For Digital Expansion Models:
The Physical Inputs and Outputs in the Expansion modules are accessed using XW and YW registers respectively. The digital inputs in the Digital Expansion Models are updated in the (Input) XW registers.

The expansion model may have XW or YW registers depending on availability of the physical input/outputs for that model type. As given in Section 7.2 'Memory Allocation of XW, YW and MW', different expansion models have different number of XW, YW and MW memory assigned for them in the base model.
e.g. The digital expansion model GDI216**S has 1 XW register memory assigned for it.
There are no outputs so no YW memory. So the input condition of GDI2816**S is read in Input Register XWxx00. Same inputs are shown in the input coils Xxx000 to Xxx015. Here xx denotes the slot number in which the expansion model is connected to V200.
Similarly, outputs register for GRO216**S model is YWxx00. For GDR288**S model it has one XW and one YW, but only 8 bits are used. Other bits are not used.

For Analog Expansion Models:
Analog Inputs and Outputs in the Analog Expansion models are accessed using XW and YW registers respectively. The type of input channel is configured from configuration registers MW.

GAD208*S:

Sr. No.	Description	Register	Type
1	Channel 1 Input Data	XWxx00	R
2	Channel 2 Input Data	XWxx01	R
3	Channel 3 Input Data	XWxx02	R
4	Channel 4 Input Data	XWxx03	R
5	Channel 5 Input Data	XWxx04	R
6	Channel 6 Input Data	XWxx05	R
7	Channel 7 Input Data	XWxx06	R
8	Channel 8 Input Data	XWxx07	R
9	Channel 1 Type Select	MWxx08	R/W
10	Channel 2 Type Select	MWxx12	R/W
11	Channel 3 Type Select	MWxx16	R/W
12	Channel 4 Type Select	MWxx20	R/W
13	Channel 5 Type Select	MWxx24	R/W
14	Channel 6 Type Select	MWxx28	R/W
15	Channel 7 Type Select	MWxx32	R/W
16	Channel 8 Type Select	MWxx36	R/W
17	Input Conversion Enable	MWxx40	R/W
18	Reserved	MWxx41	-
19	Reserved	MWxx42	-
20	Reserved	MWxx43	-
21	Reserved	MWxx44	-
22	Reserved	MWxx45	-

GDA242**S:

Sr. No.	Description	Register	Type
1	Input Channel 1 Data	XWxx00	R
2	Input Channel 2 Data	XWxx01	R
3	Input Channel 3 Data	XWxx02	R
4	Input Channel 4 Data	XWxx03	R
5	Output Channel 1 Data	YWxx00	R/W
6	Output Channel 2 Data	YWxx01	R/W
7	Input Channel 1 Type Select	MWxx06	R/W
8	Input Channel 2 Type Select	MWxx10	R/W
9	Input Channel 3 Type Select	MWxx14	R/W
10	Input Channel 4 Type Select	MWxx18	R/W
11	Output Channel 1 Type Select	MWxx22	R/W
12	Output Channel 2 Type Select	MWxx26	R/W
13	Input and Output Conversion Enable	MWxx30	R/W
14	Reserved	MWxx31	-
15	Reserved	MWxx32	-
16	Reserved	MWxx33	-
17	Reserved	MWxx34	-
18	Reserved	MWxx35	-

GDA204**S:

Sr. No.	Description	Register	Type
1	Output Channel 1 Data	YWxx00	R/W
2	Output Channel 2 Data	YWxx01	R/W
3	Output Channel 3 Data	YWxx02	R/W
4	Output Channel 4 Data	YWxx03	R/W
5	Output Channel 1 Type Select	MWxx04	R/W
6	Output Channel 2 Type Select	MWxx08	R/W
7	Output Channel 3 Type Select	MWxx12	R/W
8	Output Channel 4 Type Select	MWxx16	R/W
9	Output Conversion Enable	MWxx20	R/W

Channel Type Selection Values Table:

Use the following values in the Input and output channel type select register to configure the corresponding channel to particular type.
e.g. If you want to configure the Input channel 3 of GAD208**S model as (0 – 10 V) type, then move value 19 in MWxx16 configuration register. Here xx digital denotes the slot number in which the GAD208**S model is connected to PLC. The Conversion Enable Flag should be one to start the conversion (A to D or D to A).

Input Channel Type	Value
Not Defined	0
mV(0 - 100 mV)	1
mV(0 - 50 mV)	3
mA(0 - 20mA)	5
mA(4 - 20mA)	7
Voltage (0 - 10V)	19
Voltage (1 - 5V)	20
RTD PT-100 (alpha1)	9
RTD PT-100 (alpha2)	10
RTD PT-1000	21
Thermocouple (B-Type)	11
Thermocouple (R-Type)	12
Thermocouple (S-Type)	13
Thermocouple (E-Type)	14
Thermocouple (J-Type)	15
Thermocouple (K-Type)	16
Thermocouple (N-Type)	17
Thermocouple (T-Type)	18

Output Channel Type	Value
Not Defined	0
mA(4 - 20mA)	1
Voltage (0 - 10V)	2

SPECIAL INPUT AND OUTPUT OPTIONS

5.1 Special I/O Function Overview

The V200 PLCs support the special I/O functions as listed below:

Function name		Function summary	Remarks
Variable input filter constant		Input filter constant (ON/OFF delay time) can be set by user program. The setting range is 0 to 15 ms (1 ms units). Default value is 0 ms. This function is applied for X000 to X007 (8 points as a block).	MW10 setting is necessary to use this function.
High Speed Counter	Single phase up-counter	Counts the number of pulses of single phase pulse train. 2 channels of pulse input are available. The countable pulse rate is up to 50 kHz for each channel. Channel 1 ..... X000 count input, X002 reset input Channel 2 ..... X001 count input, X003 reset input	Only one among these 4 functions can be selected. MW10 is used to select the function.
	Single phase speed counter	Counts the number of pulses in a specified sampling time. The sampling time setting is 10 to 1000 ms (10 ms units). 2 channels of pulse input are available. The countable pulse rate is up to 50 kHz for each channel. Channel 1 ..... X000 count input Channel 2 ..... X001 count input	
	Quadrature bi-pulse counter	Counts the 2-phase pulses whose phases are shifted 90° each other. Counts up when phase A precedes, and counts down when phase B precedes. The countable pulse rate is up to 5 kHz. Phase A ..... X000 Phase B ..... X001 Reset X002	
Interrupt input function		Immediately activates the corresponding I/O interrupt program when the interrupt input is changed from OFF to ON (or ON to OFF). 2 points of interrupt input are available. X001 ..... Interrupt 1 (I/O interrupt program #1) X002 ..... Interrupt 2 (I/O interrupt program #2)	
Pulse output function		Variable frequency pulse train can be output. The available pulse rate is 50 Hz to 5 KHz (1Hz units) Y0 ..... CW or Pulse (PLS) Y1 ..... CCW or Direction (DIR)	Either one between these 2 functions can be used. MW11 is used to select the function.
PWM output function		Variable duty cycle pulse train can be output. The available ON duty setting is 0 to 100 % (1 % units). Y0 ..... PWM output	

5.2 High Speed Counter Design

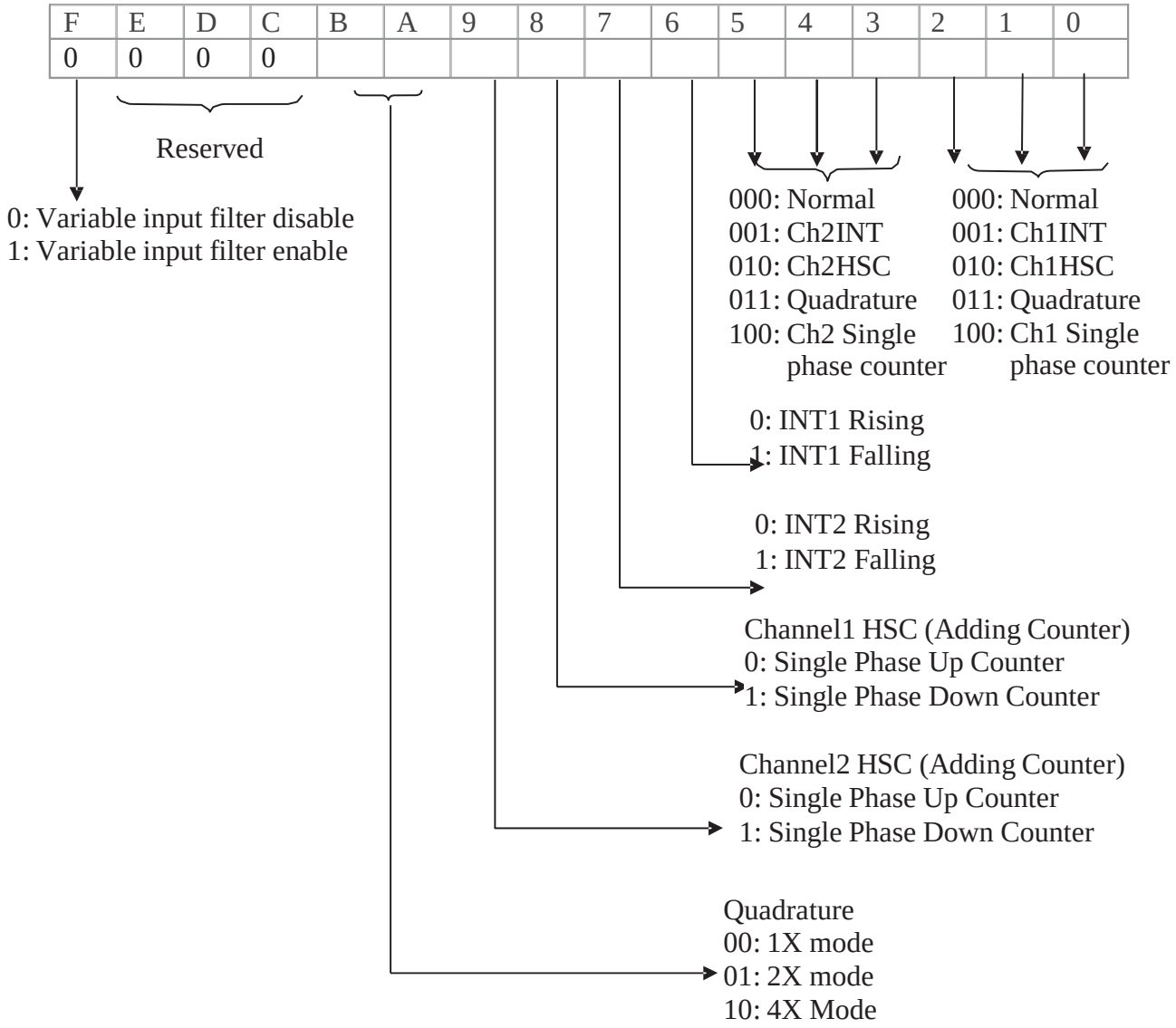
Configuration Registers for Special Function Inputs and PWM outputs:

Register Description	Register Number
Configuration Register for Special inputs	MW10
Configuration Register for PWM output	MW11
Single Phase Counter Set Value Channel 1 Channel 2	 MW12, MW13 MW14, MW15
Count Value Channel 1 Channel 2	 MW16, MW17 MW18, MW19
Soft Gate (Device) Channel 1 Channel 2 Interrupt Enable (Device) Channel 1 Channel 2 Count Preset (Device) Channel 1 Channel 2	 M 320 M 328 M 322 M330 M323 M331
Single Phase Speed Counter Sampling Time Channel 1 Channel 2 Hold Value Channel 1 Channel 2 Soft Gate (Device) Channel 1 Channel 2	 MW12 MW14 MW16, MW17 MW18, MW19 M 320 M 328
Quadrature Bi Pulse Comparison Value1 Comparison Value2 Count Value Soft Gate (Device) Interrupt Enable1 (Device) Count Preset 1 (Device) Interrupt Enable 2 (Device) Count Preset 2 (Device)	 MW12, MW13 MW14, MW15 MW16, MW17 M320 M322 M324 M323 M325
Pulse Output Function Pulse Enable Flag (Device) Frequency Setting Register Frequency Setting Error Flag (Device)	 M336 MW22, MW23 M191

PWM Output Function	
Pulse Enable Flag (Device)	M336
Frequency Setting Register	MW22, MW23
ON duty setting register	MW24, MW25
pulse width error flag	M189
On duty setting error flag	M190
Frequency Setting Error Flag (Device)	M191

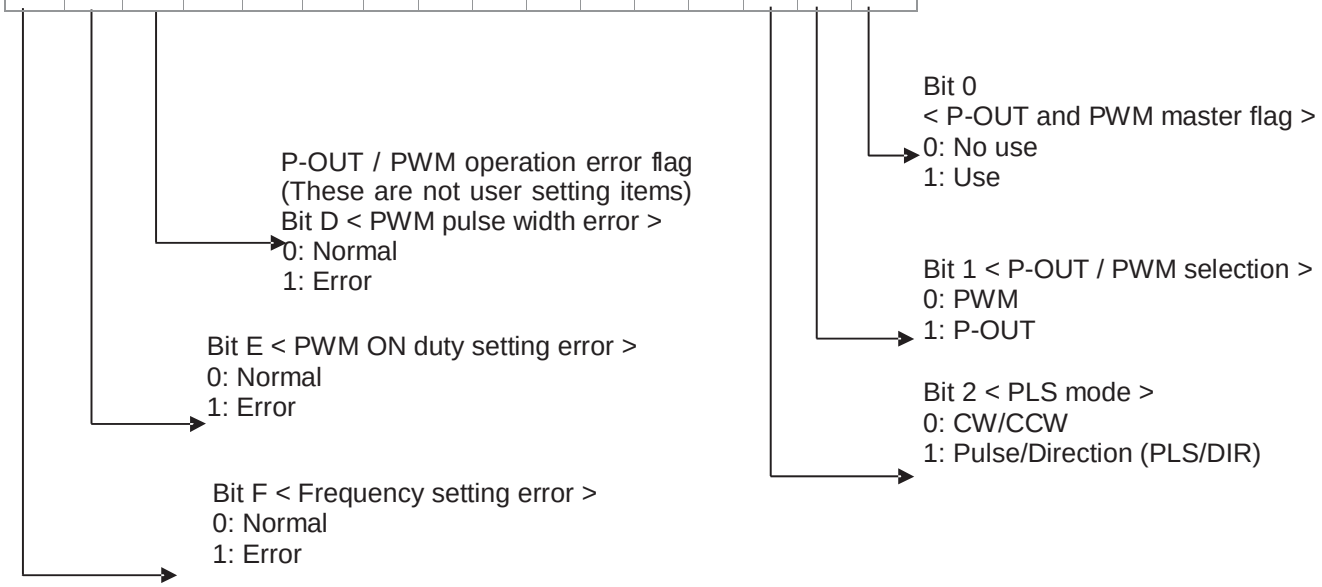
The Mode selection is done through two registers as below.

Configuration Register 10 (High Speed Input): (MW0010).



Configuration Register 11 (Pulse / PWM Output): MW0011

F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
			0	0	0	0	0	0	0	0	0	0			



5.3 Single Phase Speed Counter

When the count input is changed from OFF to ON, the count value is increased by 1. When the count value reaches the set value, the count value is reset to 0, and I/O interrupt program is activated (if the interrupt enable flag is ON). The count value is reset to 0 when the reset input comes ON. This counter operation is enabled while the soft-gate is ON. The count value is reset to 0 when the soft-gate is changed from ON to OFF. The set value is set internally at the timing of the soft-gate changing from OFF to ON. When the soft-gate is OFF, count value can be changed by writing the data into the set value register and setting the count preset flag to ON. The count value range is H0000 0000 to HFFFF FFFF (32-bit data).

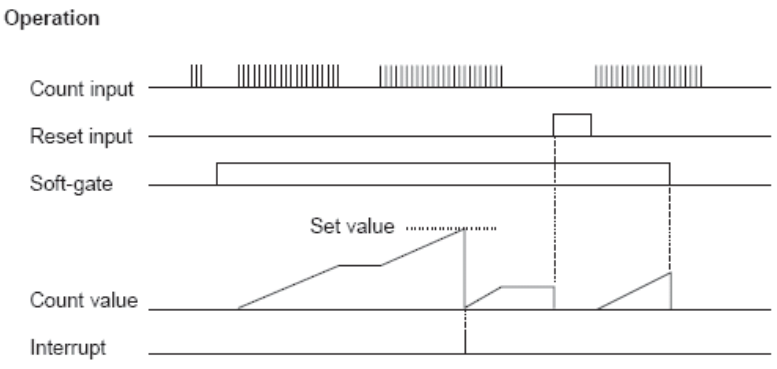
Hardware Condition:
Count input (IP 1 and IP 2) (X000 and X001)
ON/OFF pulse width: 10 micro or more (max. 50 kHz)
Reset input (X002 and X003)
ON/OFF duration: 2 ms or more

Related Registers:

Function	**Register/device**		**Remarks**
	Channel 1	**Channel 2**	
Count input	IP 1 (X000)	IP 2 (X001)	
Reset input	IP 3 (X002)	IP 4 (X003)	
Set value	MW12 SW13	MW14 MW15	Data range: H0000 0000 to HFFFF FFFF
Count value	MW16 MW17	MW18 MW19	
Soft-gate	M320	M328	Operation is enabled when ON
Interrupt enable	M322	M330	Interrupt is enabled when ON
Count preset	M323	M331	Used to preset the counter value

Note1:
When both the channels are configured in high speed mode, IP1 to IP4 cannot be used as normal input devices. However, if either one channel is configured in high speed mode, the inputs for other channel can be used as normal input devices.
Note2:
Two words are used for storing the double word (32bit) count/set values. Lower word will contain Lower 16bit value and Higher word will contain higher 16 bit. This register storage scheme is applicable for all the modes.
value. Eg. Count value : MW16,MW17
So if count value is (Hex) 87654321
MW16 = 4321 (Hex)
MW17= 8765 (Hex)
Note3:
Input 3 and input 4 are used as reset inputs for count inputs 1 and 2. So do not use input 3 and 4 as normal inputs when PLC is configured in this mode.

Interrupt assignment
Channel 1 --- I/O interrupt program #1
Channel 2 --- I/O interrupt program #2



5.4 Single Phase Speed Counter

This function counts the number of changes of the count input from OFF to ON during the every specified sampling time. The count value in a sampling time is stored in the hold value register. This counter operation is enabled while the soft-gate is ON. When the soft-gate is OFF, the hold value is cleared to 0. The setting range of the sampling time is 1 to 1000 ms (1 ms units). The count value range is H0000 0000 to HFFFF FFFF (32-bit).

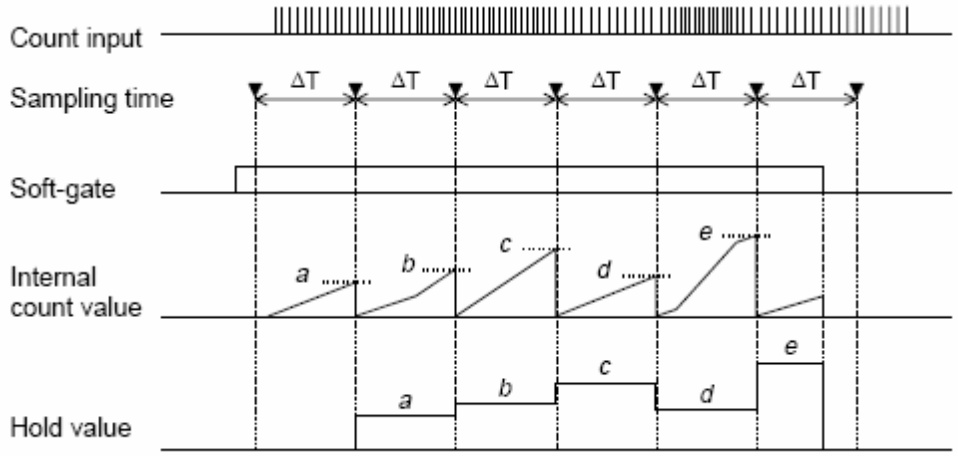
The function selection is done through configuration register1.

Function	Register/device		Remarks
	Channel 1	Channel 2	
Count input	IP 1 (X000)	IP 2 (X001)	
Sampling time	MW12	MW14	Data range: 1 to 1000
Hold value	MW16	MW18	Data range: H0000 0000 to HFFFF FFFF
Soft-gate	M320	M328	Operation is enabled when ON

Note 1) The setting data range of the sampling time is 1 to 1000. (1 ms multiplier)
Note 2) When both the channels are configured in high speed mode, IP1 & IP2 cannot be used as normal input devices. However, if either one channel is configured in high speed mode, the input of other channel can be used as normal input device.

Hardware condition:
Count input (X000 and X001)
ON/OFF pulse width: 10 micro or more (max. 50 kHz)

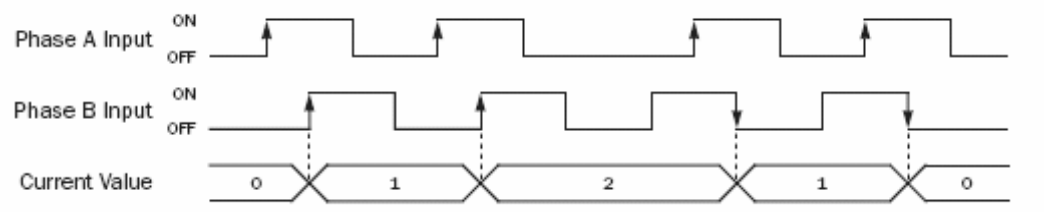
Interrupt assignment:
No interrupt function



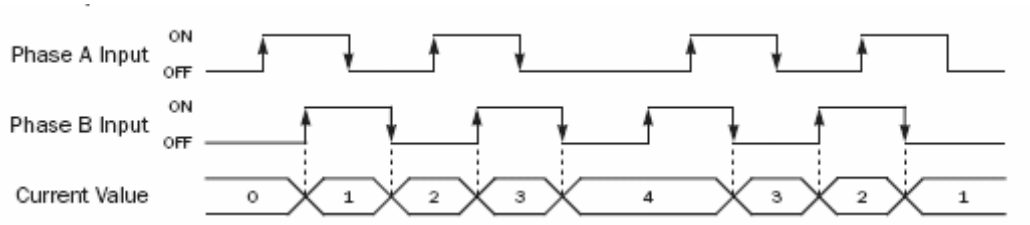
5.5 Quadrature Bi-pulse Counter

This function counts up or down the quadrature bi-pulse (2-phase pulses whose phases are shifted 90° each other). Counts up when phase A precedes, and counts down when phase B precedes.

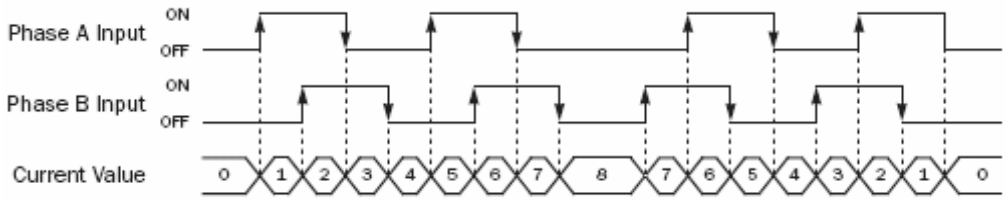
1-edge count:
The current value increments or decrements at the rising or falling edge of the phase B input after the phase A input has turned on.



2-edge Count:
The current value increments or decrements at the rising or falling edge of the phase B input after the phase A input has turned on or off.



4-edge Count:
The current value increments or decrements at the rising or falling edges of the phase A and B inputs.



Both rising and falling edges of each phase are counted.
Consequently, 4 times count value against the pulse frequency is obtained.

When the count value reaches the comparison value 1 (or 2), the I/O interrupt program#1 (or #2) is activated (if the interrupt enable flag for each is ON). This counter operation is enabled while the soft-gate is ON. The count value is reset to 0 when the soft-gate is changed from ON to OFF. The count value is also reset to 0 when the reset input comes ON. When the soft-gate is OFF, the count value can be changed by writing the data into the comparison value 1 (or 2) register and setting the count preset flag 1 (or 2) to ON. The comparison value 1 and 2 can be changed even when the soft-gate is ON. The count value range is 0 to 4294967295 (32-bit data).

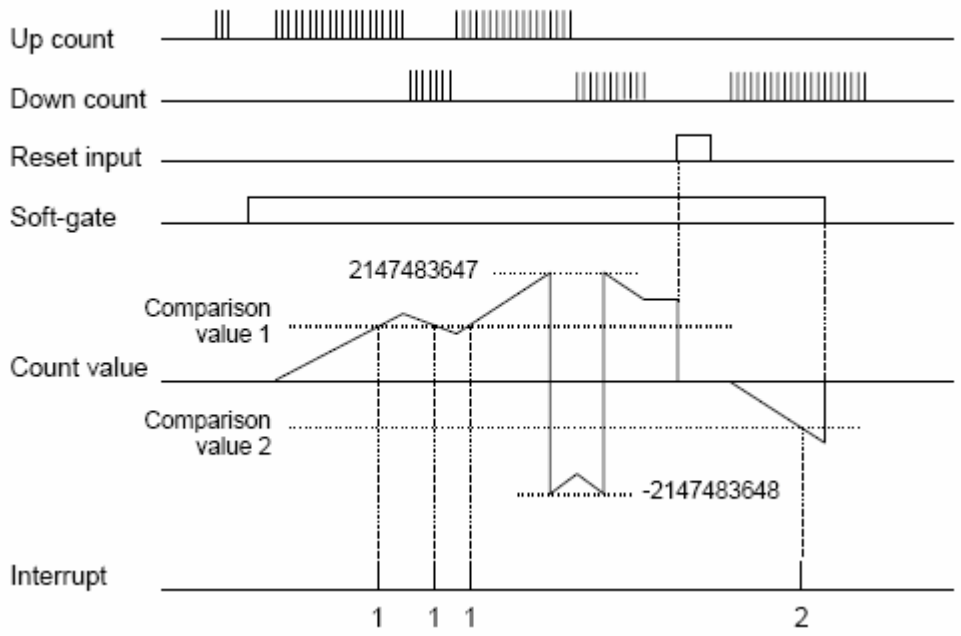
The function selection is done through configuration register1

Function	Register/device	Remarks
Phase A	IP 1 (X000)	
Phase B	IP 2 (X001)	
Reset input	IP 3 (X002)	
Comparison value 1	MW12 MW13	Data range: 0 to 4294967295
Comparison value 2	MW14 MW15	
Count value	MW16 MW17	
Soft-gate	M320	Operation is enabled when ON
Interrupt enable 1	M322	Interrupt 1 is enabled when ON
Count preset 1	M324	Used to preset the count value
Interrupt enable 2	M323	Interrupt 2 is enabled when ON
Count preset 2	M325	Used to preset the count value

Hardware condition:
Phase A and phase B (IP 1 and IP 2)
1X Mode
ON/OFF pulse width: 100 micro sec. or more (max. 5 kHz)
2X Mode
ON/OFF pulse width: 100 micro sec. or more (max. 5 kHz)
4X Mode
ON/OFF pulse width: 100 micro sec. or more (max. 5 kHz)

Reset input (IP3)
ON/OFF duration: 2 ms or more

Interrupt assignment:
Comparison value 1 — I/O interrupt program #1
Comparison value 2 — I/O interrupt program #2

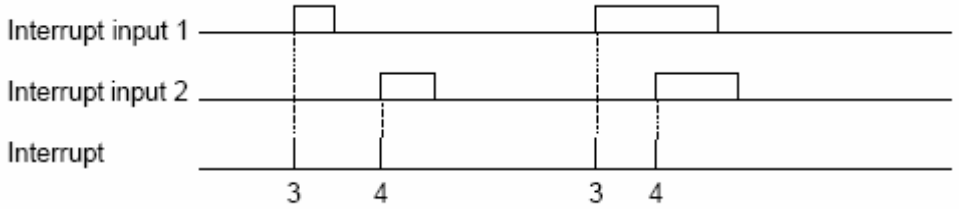


5.6 Interrupt Input Function

When the signal state of the interrupt input is changed from OFF to ON (or ON to OFF), the corresponding I/O interrupt program is activated immediately. Up to 2 interrupt inputs can be used. The interrupt generation condition can be selected either rising edge (OFF to ON) or falling edge (ON to OFF) for each input. The I/O interrupt program #1 is corresponding to the interrupt input 1, and the I/O interrupt program #2 is corresponding to the interrupt input 2.

Hardware condition
Interrupt input (IP 1 and IP 2)
ON/OFF pulse width: 100 microsec. or more

Interrupt assignment
Interrupt input 1 — I/O interrupt program #1
Interrupt input 2 — I/O interrupt program #2



5.7 Pulse Output Function

There are two transistor outputs Y0 and Y1 and can be used for pulse output.

When CW/CCW mode is selected if frequency is positive, match output 1 will be selected so that pulses will be out on Y0 and if frequency is negative match output 2 will be selected so that pulses will be out on Y1.
In PULSE/DIR mode the pulses will be out on Y0 i.e. Match output1. If the frequency is negative then direction pin can be set to high through Match output 2.

Function		Register/device	Remarks
CW/ CCW	PLS/DIR		
CW Pulse	PLS	Y0	
CCW Pulse	DIR	Y1	
Pulse enable flag		M336	Output is enabled when ON
Frequency setting register		MW22 MW23	Data range: -5000 to –50, 50 to 5000
Frequency setting error flag		M191	ON at error (Reset OFF automatically)

5.8 PWM Output Function

This function is used to output a variable duty cycle pulse train. The controllable duty cycle is 0 to 100 % (1 % units). The PWM output is enabled when the pulse enable flag is ON. While the pulse enable flag is ON, the duty cycle (ON duty) can be changed by changing the duty setting value (0 to 100). The frequency setting is available in the range of 50 to 5000 Hz (1 Hz units) before turning ON the pulse enable flag. The frequency changing is not allowed while the pulse enable is ON. Note that the minimum ON/OFF pulse duration is 100 microsec. Therefore, the controllable ON duty range is limited depending on the frequency setting as follows. If the ON duty setting value is not available (within 0 to 100), the pulse width error flag comes ON. (PWM output operation is continued but the duty cycle is not guaranteed)

The function selection is done through configuration register2

Function	Register/device	Remarks
PWM pulse	Y0	
Pulse enable flag	M336	Output is enabled when ON
Frequency setting register	MW22 – MW23	Data range: 50 to 5000
ON duty setting register	MW24 –MW25	Data range: 0 to 100
Pulse width error flag	M189	ON at error (reset OFF automatically)
ON duty setting error flag	M190	ON at error (reset OFF automatically)
Frequency setting error flag	M191	ON at error (reset OFF automatically)

The Buffer is updated at each scan, so that the PWM frequency and duty cycle will be changed after each scan.

OPERATING SYSTEMS OVERVIEW

- System Operating Modes
- Mode Selection

6.1 Operating System Overview

The V200 CPU has three basic operation modes, the RUN mode, the HALT mode and the ERROR mode. It also has the HOLD and RUN-F modes mainly for system checking.

RUN: The RUN mode is a normal control-operation mode.
In this mode, the V200 CPU model reads input signals, executes the user program, and updates the output devices according to the user program. In the RUN mode, V200 PLC executes the user's ladder program logic, which is the basic operation of a PLC.
In this mode task defined in the application are also executed.
EEPROM write are possible while the V200 CPU is in the RUN mode.

HALT: The HALT mode is a STOP mode.
In this mode, user program execution is stopped and all outputs are brought to zero (0).
Program loading into the V200 CPU unit is possible in the HALT mode.

ERROR: The ERROR mode is a shutdown mode as a result of self-diagnosis.
The V200 CPU model enters the ERROR mode if internal error is detected by self-diagnosis. In this mode, program execution is stopped and all outputs are brought to "Error State Output Condition" defined in the application. The cause of the shutdown can be confirmed by connecting the programming tool.
To exit from the ERROR mode, execute the Error Reset command from the programming tool, or cycle power off and then on again.

HOLD: The HOLD mode is provided mainly for checking the external I/O signals.
In this mode, user program execution is stopped, with input and output updating is executed. It is therefore possible to suspend program execution while holding the output state. Moreover, a desired output state can be established by setting any data by using the programming tool.

RUN-F: The RUN-F mode is a forced RUN mode provided for program checking.
This mode is effective when using the expansion I/Os.
Different from the normal RUN mode, the RUN-F mode allows operation even if the registered I/O modules are not actually mounted.
In this mode the physical outputs are not updated; only the registers are updated.

6.2 Mode Selection

The operation modes are switched by the mode control switch provided on the V200 base model and the mode control commands issued from the OIL-DS.

PROGRAMMING INFORMATION

7.1 Devices Registers

Broadly two types of registers are present in PLC register database:

1. Internal PLC Registers: Implemented through buffers present in RAM of Base module.
    Data Registers (D).
    Auxiliary Registers (BW/B).
    System Registers (SW).
    System coil (S).
    Timer Registers (T).
    Counter Registers (C).
    Base module configuration Registers (MW/M) (Coils and registers are mapped)
    I/O Registers of Base Module (XW/X, YW/Y) (Coils and registers are mapped)
    Timer devices (T.)
    Counter devices (C.)

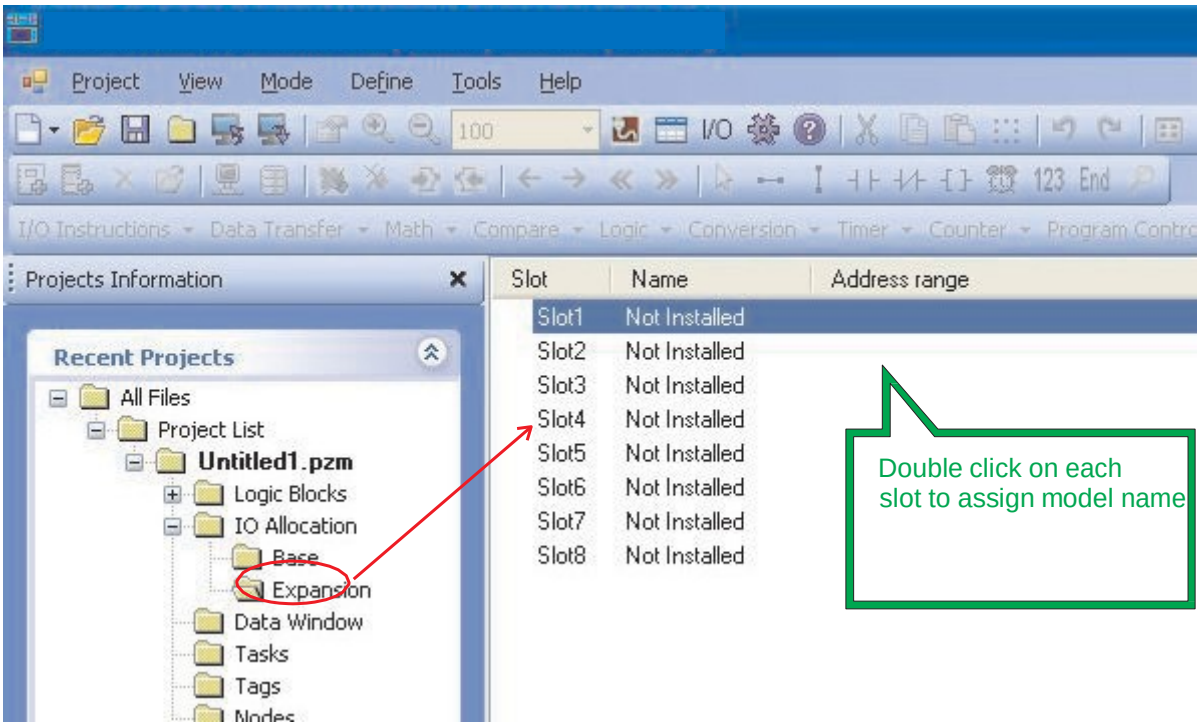
2. Expansion and Serial I/O Registers: These are external to the unit and can be accessed by communicating with external module over SPI or serial:
    I/O Registers of expansion module and serial module (XW/X, YW/Y).
    Configuration Registers (MW/M).

XW, YW, MW, X, Y, M register types of both the register types; viz: base, expansion and serial are encoded with the following addressing scheme:

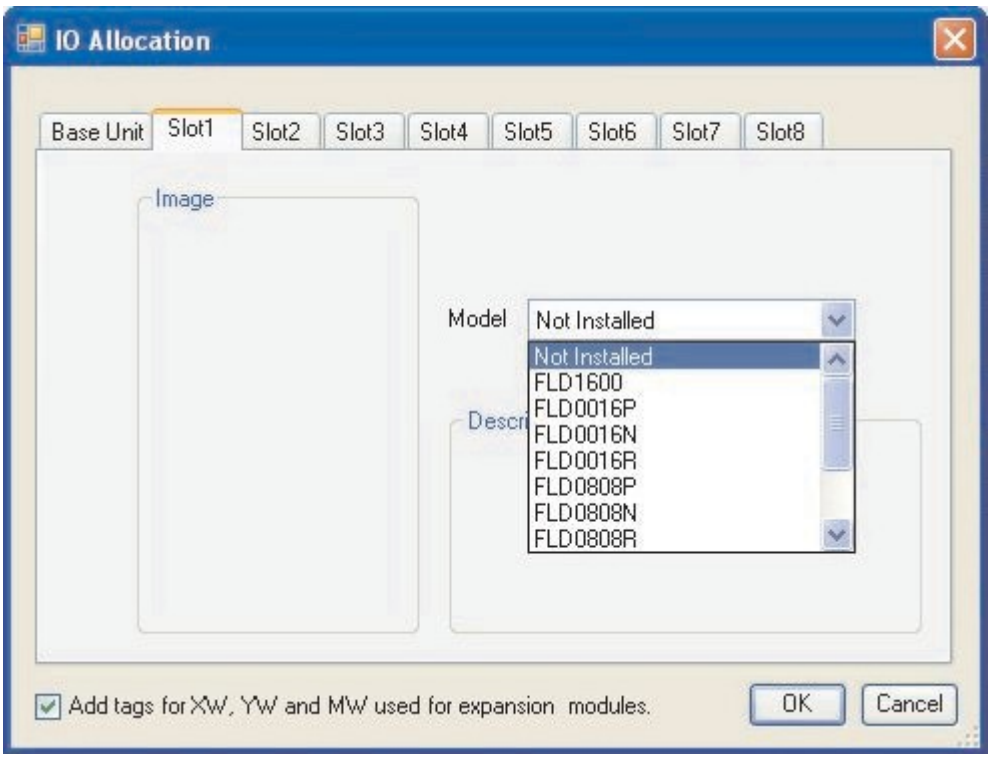
XWssrr YWssrr MWssrr	ss: Slot Number rr: register number in slot ss
Xssccc Yssccc Mssccc	ss: Slot Number ccc: coil number in slot ss

Note:
"0" (Zero) is the slot number of CPU module.

You can allot “ss” (slot number) from “Project Information” docker window; “IO Allocation\Local” section as shown below:

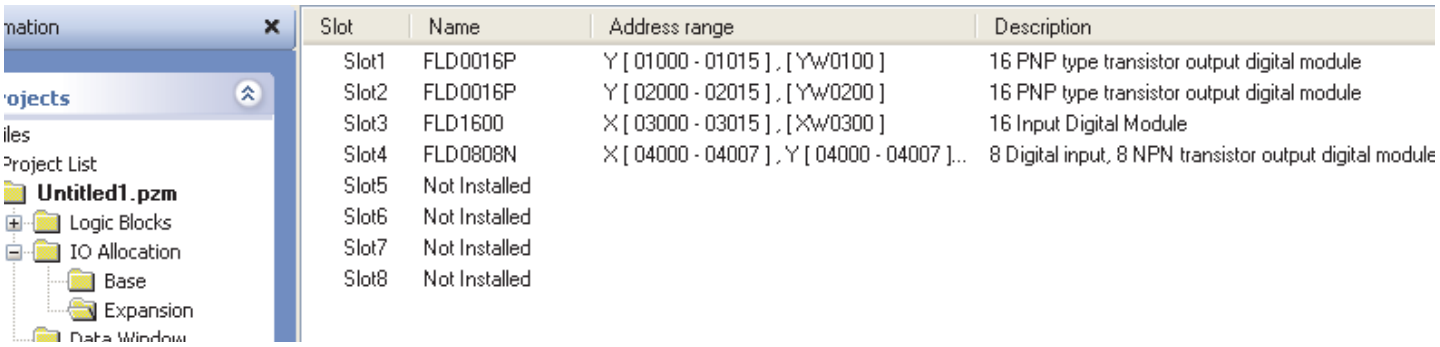


When you double click on the highlighted slot section; below shown window will appear:



Note: Here you have to allocate slots serially. If you try to allocate randomly; it will show as an expansion error. Modules for PLC are sequential; the previous slot can not be empty.

Thus, you can assign the expansion models as needed:



In the above shown screen, you can observe that the address range for the expansion models assign for Slot 1 through Slot 4, it has taken first two digit as 01, 02, 03 & 04 serially.
And last three digits will indicate the register numbers.

The external input signals are allocated to the external input devices/registers (X/XW). The external output signals are allocated to the external output devices/registers (Y/YW).
The register numbers of the external input and output registers are consecutive. Thus one register number can be assigned for either input or output.

X01000 - - - - - - - - - X01007

GDD288N

Y01000 - - - - - - - - - Y01007

X 0 1 0 0 0
- X: Input
- Slot Number (Slot 1)
- Input: 8 Nos. (000 to 0007)

Y 0 1 0 0 0
- Y: Output
- Slot Number (Slot 1)
- Output: 8 Nos. (000 to 007)

Similarly.....

X02000 - - - - - - - - - X01003

GAA244

Y02000 - - - - - - - - - Y01003

X 0 2 0 0 0
- X: Input
- Slot Number (Slot 2)
- Input: 4 Nos. (000 to 0003)

Y 0 2 0 0 0
- Y: Output
- Slot Number (Slot 2)
- Output: 4 Nos. (000 to 003)

System Register for Special Function Inputs and PWM outputs:

Register Description	Register Number
Configuration Register for Special inputs	MW10
Configuration Register for PWM output	MW11
Single Phase Counter	
Set Value	
Channel 1	MW12, MW13
Channel 2	MW14, MW15
Count Value	
Channel 1	MW16, MW17
Channel 2	MW18, MW19
Soft Gate (Device)	
Channel 1	M 320
Channel 2	M 328
Interrupt Enable (Device)	
Channel 1	M 322
Channel 2	M330
Count Preset (Device)	
Channel 1	M323
Channel 2	M331

Register Description	Register Number
Single Phase Speed Counter	
Sampling Time	
Channel 1	MW12
Channel 2	MW14
Hold Value	
Channel 1	MW16, MW17
Channel 2	MW18, MW19
Soft Gate (Device)	
Channel 1	M 320
Channel 2	M 328
Quadrature Bi Pulse	
Comparison Value1	MW12, MW13
Comparison Value2	MW14, MW15
Count Value	MW16, MW17
Soft Gate (Device) Interrupt	M320
Enable1 (Device) Count	M322
Preset 1 (Device) Interrupt	M324
Enable 2 (Device) Count	M323
Preset 2 (Device)	M325
Pulse Output Function	
Pulse Enable Flag (Device)	M336
Frequency Setting Register	MW22, MW23
Frequency Setting Error Flag (Device)	M191
PWM Output Function	
Pulse Enable Flag (Device)	M336
Frequency Setting Register	MW22, MW23
ON duty setting register	MW24, MW25
pulse width error flag	M189
On duty setting error flag	M190
Frequency Setting Error Flag (Device)	M191

System Coil for Debug Function

Register Description	Register Number
S0000	Carry bit
S0021	Communication recover enable bit for port1
S0022	Communication recover enable bit for port2
S0034	Instruction error flag

No	"Device/“register"	Name	Function
1	M0016	CPU error (down)	ON at error state
2	M0017	I/O error	ON at error state
3	M0018	Program error (down)	ON at error state
4	M0019	Not Used	
5	M0020	Not Used	
6	M0021	"Clock/calendar error“(alarm)"	ON when clock/calendar data is illegal
7	M0022	"Retentive data invalid“(alarm)"	ON when retentive data in RAM are invalid
8	M0023	Not Used	
9	M0024	Not Used	
10	M0025	Not Used	
11	M0026	Not Used	
12	M0027	"Watchdog timer error“(down)"	ON at error state
13	M0028	Not Used	
14	M0029	I/O mismatch (down)	ON at error state
15	M0030	Analog Power Fail (Alarm)	ON at error state
16	M0031	BCC error (down)	ON at error state
17	M0032	Not Used	
18	M0033	Scan time over (down)	ON when the scan time exceeds 200 ms
19	M0034	Not Used	
20	M0035	Not Used	
21	M0036	Not Used	
22	M0037	Not Used	
23	M0480	System timer coil for 0.1 sec interval	
24	M0481	System timer coil for 0.2 sec interval	
25	M0482	System timer coil for 0.4 sec interval	
26	M0483	System timer coil for 0.8 sec interval	
27	M0484	System timer coil for 1 sec interval	
28	M0485	System timer coil for 2 sec interval	
29	M0486	System timer coil for 4 sec interval	
30	M0487	System timer coil for 8 sec interval	
31	M0496	Timer interrupt execution status	ON when Timer program is executing
32	M0497	IO1 interrupt execution status	ON when IO1 program is executing
33	M0498	IO2 interrupt execution status	ON when IO2 program is executing
34	M0504	Hold mode status	On when PLC is in hold mode.
35	M0512	ALWAYS ON	
36	M0513	ALWAYS OFF	

When COM ports are configured as Modbus slaves, the internal PLC tags are mapped to the modbus addresses as given in the following table:

PLC Tag description	Reg. Addressing	Bit Addressing	Modbus address
I/O register	XW(400)	X (6400)	440001 - 440400
	YW(400)	Y (6400)	441001 - 441400
Auxiliary registers	BW00-BW255	B0000 to B4095	442001 - 442256
System Registers	SW00-SW256	Not Mapped	420001 - 420256
Timer Registers	T00-T255	Not Mapped	400001 - 400256
Counter Register	C00-C255	Not Mapped	410001 - 410256
Data Registers	D0000-D4095	Not Mapped	450001 - 454096
Retentive Registers	Not Mapped	430001 - 431400	
Index Register (I,J,K)	I	Not Mapped	443001
	J	Not Mapped	443002
	K	Not Mapped	443003
Configuration MW registers	MW(1600)	M(25600)	460001-461600

COILS:

		TR0- TR15	
Input Coil (R)		X (6400)	000001 - 006400
Output Coil (R/W)		Y (6400)	010001 - 016400
System Coil (R/W)		S 0000 to S 0099	020001 - 020100
Internal Coil (R/W)		B 0000 to B 1023	030001 - 034096
Timer Devices (256 bits = 16 words)		T. 000 to T. 255	021001 - 021256
Counter Devices (256 bits = 16 words)		C. 000 to C. 255	022001 - 022256
Configuration MW coils		M(25600)	035001 - 060600

7.2 Memory Allocation of XW, YW and MW

Memory for XW, YW and MW registers for particular model is allocated by software at the time of I/O allocation. The number of XW, YW and MW for the particular model is as per the table given below:

Sr. No.	Model Name	Description	XW	YW	MW	X	Y
1	GPU288	V200 Base Model	1	1	60	8	8
2	GPU200	V200 Base Module with Ethernet	0	0	60	0	0
3	GDI216	16 Input Digital Module	1	0	0	16	0
4	GDO216P	16 PNP type transistor output digital module	0	1	0	0	16
5	GDO216N	16 NPN type transistor output digital module	0	1	0	0	16
6	GRO216	16 Relay type output digital module	0	1	0	0	16
7	GDD216P	8 Digital input, 8 PNP type transistor output digital module	1	1	0	8	8
8	FLD0808N	8 Digital input, 8 NPN type transistor output digital module	1	1	0	8	8
9	GDR216	8 Digital input, 8 Relay type output digital module	1	1	0	8	8
10	GAD208L	0-10 VDC or 4-20 mA (16 Bit) 8 channel input model	8	0	50	0	0
11	GDA204	0-10 VDC or 4-20 mA (16 Bit) 4 channel output model	0	4	30	0	0
12	GRT208	PT100 RTD (16 Bit) 8 channel input model	8	0	50	0	0
13	GAA242	4 Universal Analog Inputs (RTD, TC, 4-20 mA, 0-20mA,0-50mV, 0-100mV, 0-10VDC) (16 Bit), 2 channel Voltage/Current (16 Bit) outputs.	4	2	40	0	0

The allocation is sequential. If any particular model does not have XW / YW / MW defined then the memory is not allocated in the array for that model. This array is sequentially mapped to Modbus registers.

Consider the example that user has configured the models as below:

Slot 0 : GPU288 : XW : 1, YW : 1, MW : 60
Slot 1 : GDR288 : XW : 1, YW : 1, MW : 0
Slot 2 : GRO216 : XW : 0, YW : 1, MW : 0
Slot 3 : GDD288N : XW : 1, YW : 1, MW : 0
Slot 4 : GDI216 : XW : 1, YW : 0, MW : 0
Slot 5 : GAD208L : XW : 8, YW : 0, MW : 50

Then the array of XW, YW and MW will be as follows:

XW	Allocated for register	Modbus Slave register address
0	GPU288 (XW0000)	440001
1	GDR288 (XW0100)	440002
2	GDD288N (XW0300)	440003
3	GDI216 (XW0400)	440004
4	GDI216 (XW0401)	440005
5	GAD208L (XW0500)	440006
6	GAD208L (XW0501)	440007
7	GAD208L (XW0502)	440008
8	GAD208L (XW0503)	440009
9	GAD208L (XW0504)	440010
10	GAD208L (XW0505)	440011
11	GAD208L (XW0506)	440012
12	GAD208L (XW0507)	440013
13	Not used	
….	Not used	
399	Not used	

YW	Allocated for register	Modbus Slave register address
0	GPU288 (YW0000)	441001
1	GDR288 (YW0100)	441002
2	GRO216 (YW0200)	441003
3	GDD288N (YW0300)	441004
4	Not used	
….	Not used	
….	Not used	
399	Not used	

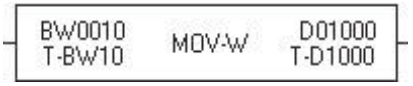
MW	Allocated for register	Modbus Slave register address
0 to 59	GPU288 (MW0000 to MW0059)	460001 to 460060
60 to 109	GAD208L (MW0500 to MW0549)	460061 to 460110
110	Not used	
….	Not used	
….	Not used	
1599	Not used	

7.3 Index Modification

When registers are used as operands of instructions, the method of directly designating the register address as shown in Example 1) below is called ‘direct addressing’.

As opposed to this, the method of indirectly designating the register by combination with the contents of the index register (I, J, or K) as shown in Example 2 below is called ‘indirect addressing’. In particular, in this case, since the address is modified using an index register, this is called ‘index modification’.

Example - 1)



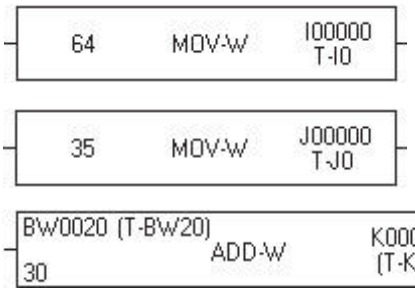
Data transfer instruction
Transfer data of BW010 to D1000

Example - 2)

Data transfer instruction (with index modification)
Transfer data of BW(10 + I) to D(0000 + J)
(If I = 3 and J = 200, the data of BW13 is transferred to D0200).

There are 3 types of index registers, I, J and K. Each type processes 16-bit integers (-32768 to 32767). There are no particular differences in function between these 3 types of index registers.

There is no special instruction for substituting values in these index registers. These are designated as destination of data transfer instructions, etc.



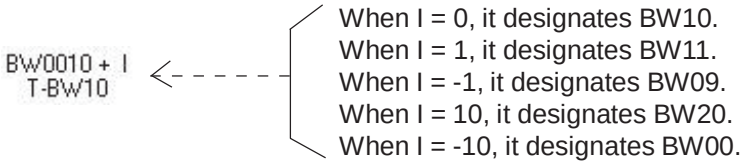
(substitutes 64 in index register I)

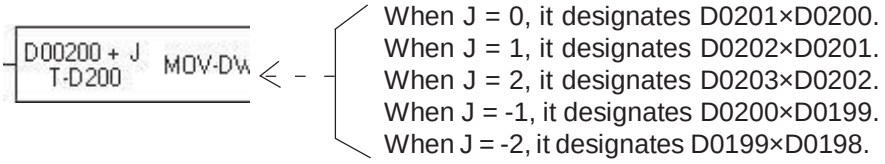
(substitutes the data of D0035 in index register J)

(substitutes the result of addition in index register K)

Note:
(1) The index modification is available for RW, T, C and D registers.
(2) If index registers are used as a double-length register, only the combinations J×I and K×J are allowed.

The followings are examples of index modifications:





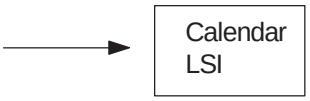
Note:
Be careful that the registers do not exceed the address range by the index modification. The address range is not checked by the V200 PLC.

Substitutions of values into index registers and index modifications can be used any times in a program. Normally, the program will be easier to see if a value substitution into an index register is positioned immediately before the index modification.

7.4 Real-time Clock / Calendar

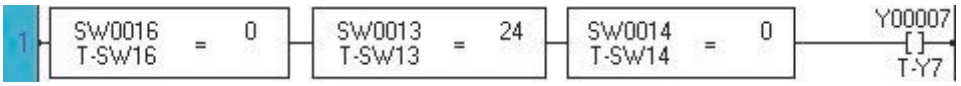
The V200 CPUs are equipped with the real-time clock/calendar for day of the month, month, year, hour, minute, second and day of week. This data is stored in the special registers SW10 to SW16 by unsigned integer format as follows:

	F 8	7 8	
D0050	00	Day of month	00 to 99 (2000 - 2099)
D0051	00	Month	01 to 12
D0052	00	Year	01 to 31
D0053	00	Hour	00 to 23
D0054	00	Minute	00 to 59
D0055	00	Second	00 to 59
D0056	00	Day of week	00 to 06



Note:
The day of the week is automatically,
Sunday = 0, Monday = 1, Tuesday = 2..... Saturday = 6

Program example:
In the following circuit, output Y007 turns ON for 1 minute at every Sunday 6 pm.



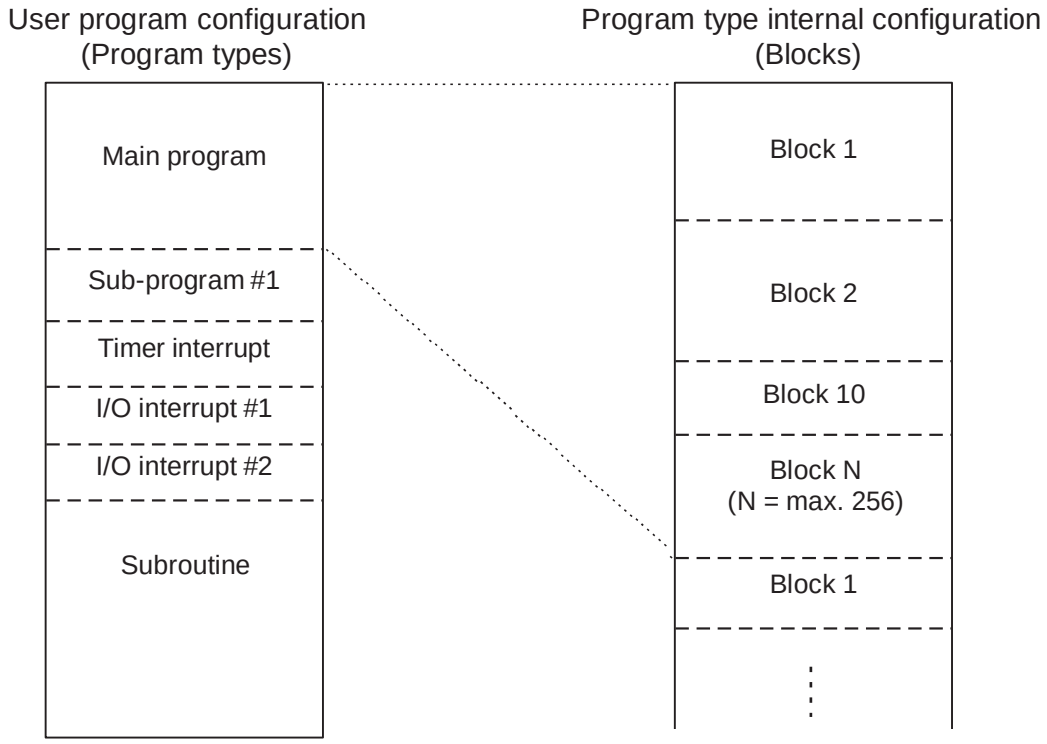
Clock/calendar back-up:
The clock / calender continues to update using internal battery backup even if the external 24 VDC power to V200 CPU is switched OFF. The backup time period is as follows:

Temperature	Backup Time
25^{O}C	20 Years

Setting the clock/calendar:
You can set the clock/calendar data, by using the Calendar Set instruction (CLND) in the user program.

7.5 User Program

The user program is stored by each program types as shown in the following diagram and is managed by units called blocks in each program types.



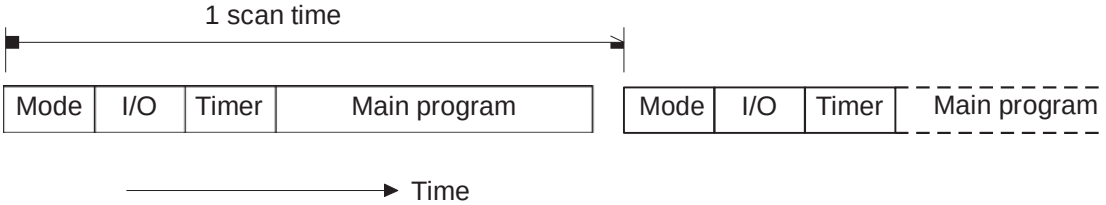
In the user program, the main program is the core. The scan operation explained is for the main program. The operation of other program types are explained in the following sections:
The following 6 program types are supported by the V200 .

(1)……..Main program
(2) Sub-program #1
(3) Timer interrupt program
(4) I/O interrupt program #1
(5) I/O interrupt program #2
(6) Subroutine

The blocks are just separators of the program, and have no effect on the program execution. However, by dividing the user program into some blocks, the program becomes easy to understand. The block numbers need not be con-seductive. In each program type and block, there is no limit of program capacity. The only limit is the total capacity.

7.5.1 Main Program

The main program is the core of the user program. It is executed once in each scan.



In the above figure,

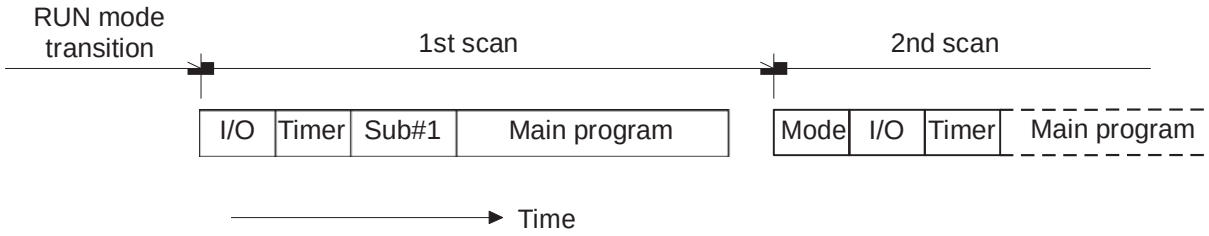
Mode means the mode control operation
I/O means the I/O update processing
Timer means the timer up date processing
Main program means the main program execution
the self-diagnostic check and peripheral support are omitted in this figure.

The end of the main program is recognized by the END instruction. Although instructions may be present after the END instruction, that portion will not be executed.

7.5.2 Sub-Program # 1

If the sub-program #1 is programmed, it is executed once at the beginning of the first scan (before main program execution). Therefore, the sub-program #1 can be used to set the initial value into the registers. The sub-program #1 is called the initial program.

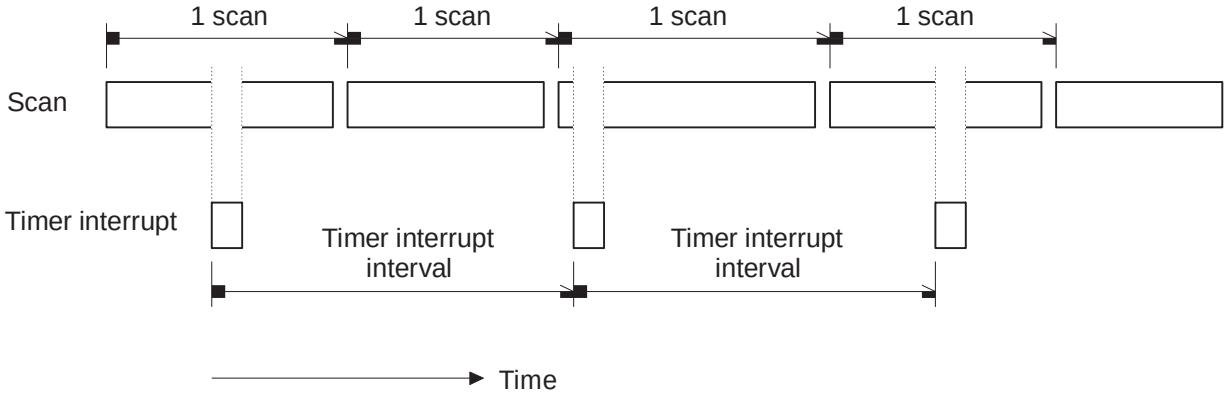
The figure below shows the first scan operation.



The end of the sub-program #1 is recognized by the END instruction.

7.5.3 Timer Interrupt Program

The timer interrupt is the highest priority task. It is executed cyclically with a user specified interval, while suspending other operation. The operations interval is set in the system information. (5 to 1000 ms, 5 ms units).



The end of the timer interrupt is recognized by the IRET instruction.

7.5.4 I/O Interrupt Program

The I/O interrupt program is also the highest priority task. It is executed immediately when the interrupt factor is generated, while suspending other operations.
The following 2 types I/O interrupt programs are supported in the V200 CPU.

(1) I/O interrupt #1
The I/O interrupt #1 is used with the high speed counter function. When the count value reaches the preset value, etc., the I/O interrupt #1 is activated immediately with suspending other operation. The end of the I/O interrupt #1 is recognized by the IRET instruction.

(2) I/O interrupt #2
The I/O interrupt #2 is also used with the high speed counter function.

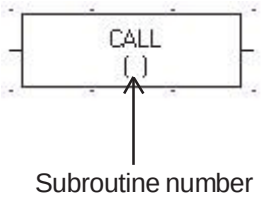
If an interrupt factor is generated while other interrupt program is executing (including the timer interrupt), the interrupt factor is hold. Then it will be activated after finishing the other interrupt program execution.

If two or more interrupt factors are generated at the same time, the priority is as follows:
Timer > I/O #1 > I/O #2

7.5.5 Subroutines

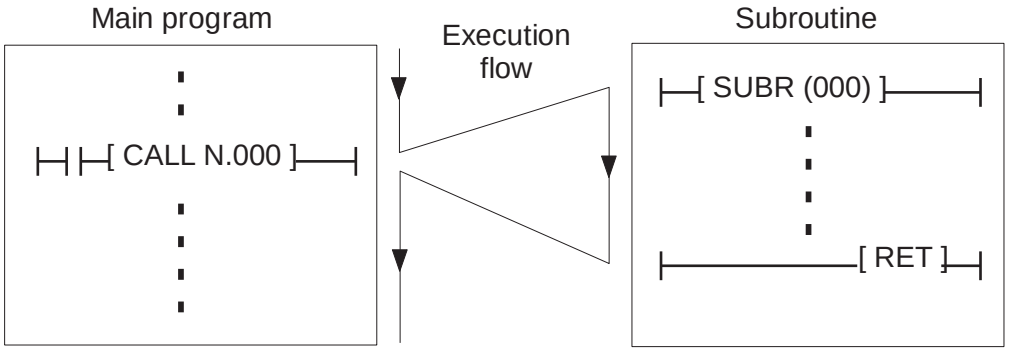
In the program type ‘Subroutine’ total 256 numbers of subroutines can be programmed.
The subroutine is not an independent program. It is called from other program types (main program, sub-program, interrupt program) and from other subroutines.

One subroutine is started with the CALL instruction, and ended by the RET instruction.
It is necessary to assign a subroutine number to the CALL instruction.



Subroutine number

The RET instruction has no subroutine number.

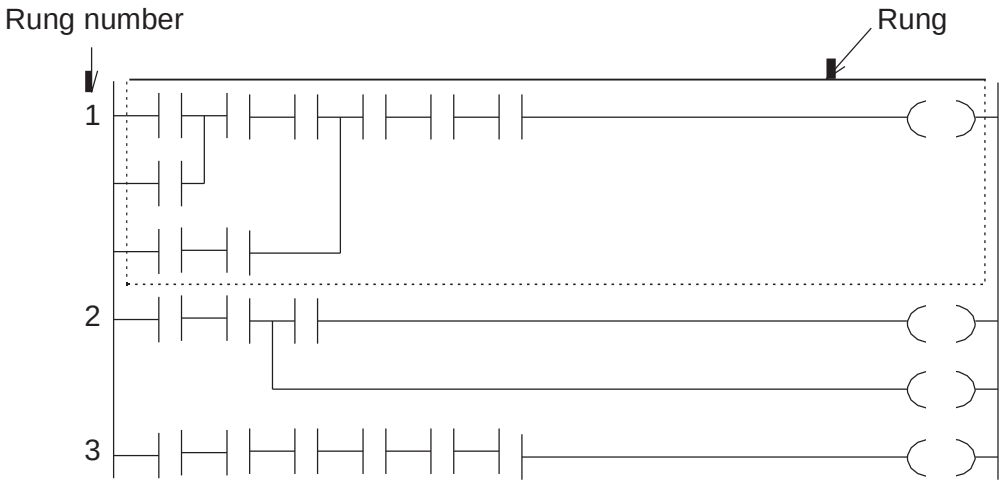


Note: (1) Multiple subroutines can be programmed in a block. However, one subroutine in one block is recommended.

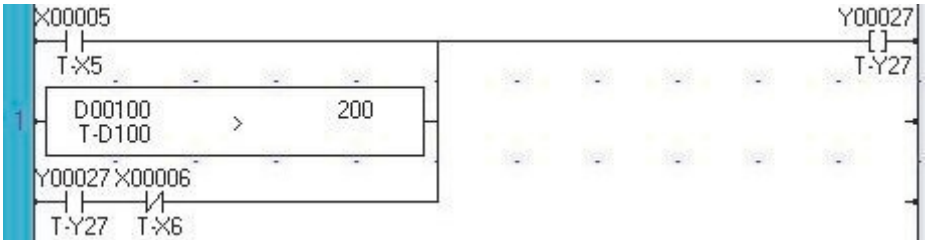
7.6 Programming Language

The programming language of theV200 Series is ‘ladder diagram’. Ladder diagram is a language which composes pro- gram using relay symbols as a base in an image similar to a hard-wired relay sequence. In the V200 CPU, in order to achieve an efficient data-processing program, ladder diagram which are combinations of relay symbols and function blocks are used.

The ladder diagram program is constructed by units called ‘rung’. A rung is defined as one network which is connected to each other.



The rung numbers are a series of numbers (decimal number) starting from 1, and cannot be skipped. There is no limit to the number of rungs.
The size of any one rung is limited to 50 lines X 11 columns.
A example of a ladder diagram program is shown below.



When X005 is ON or the data of D0100 is greater than 200, Y027 comes ON. Y027 stays ON even if X005 is OFF and the data of D0100 is 200 or less.
Y027 will come OFF when X006 comes ON.

7.7 Program Execution Sequence

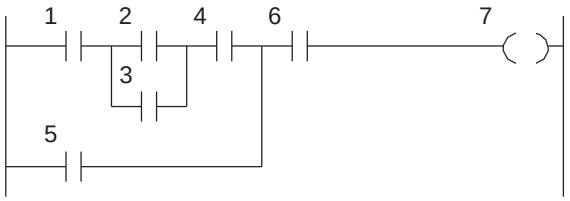
The instructions execution sequence is shown below.
(1) They are executed in the sequence from block 1 through the final block which contains the END instruction (or IRET in an interrupt program).

(2) They are executed in the sequence from rung 1 through the final rung in a block (or the END instruction).

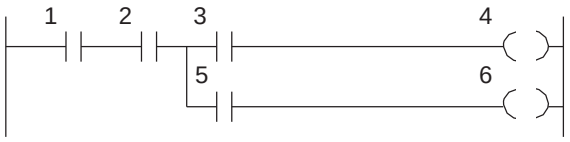
(3) They are executed according to the following rules in any one rung.

① When there is no vertical connection, they are executed from left to right.

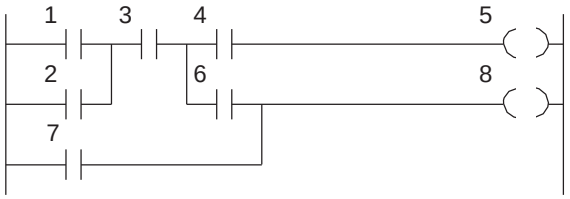
② When there is an OR connection, the OR logic portion is executed first.



③ When there is a branch, they are executed in the order from the upper line to the lower line.



④ A combination of ② and ③ above.



The instructions execution sequence in which function instructions are included also follows the above rules. However, for program execution control instructions, such as jumps (JCS), loops (FOR-NEXT), subroutines (CALL-SUBR-RET), it will depend on the specifications of each instruction.

TROUBLESHOOTING

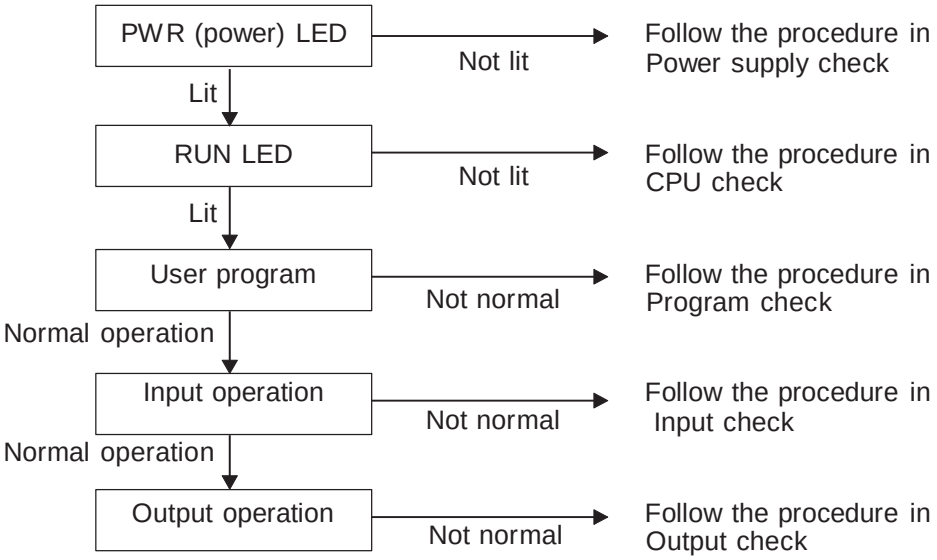
8.1 Troubleshooting Procedure

CAUTION

1. Pay special attention during the troubleshooting to minimize the risk of electrical shock.
2. Turn off power immediately if the V200 or related equipment is emitting smoke or odor. Operation under such situation can cause fire or electrical shock.
3. Turn off power before removing or replacing units, modules, terminal blocks or wires. Failure to do so can cause electrical shock or damage to the PLC and related equipment.
4. Contact Toshiba for repair/replacement if the V200 or related equipment fails. Toshiba will not guarantee proper operation nor safety for unauthorized repairs.

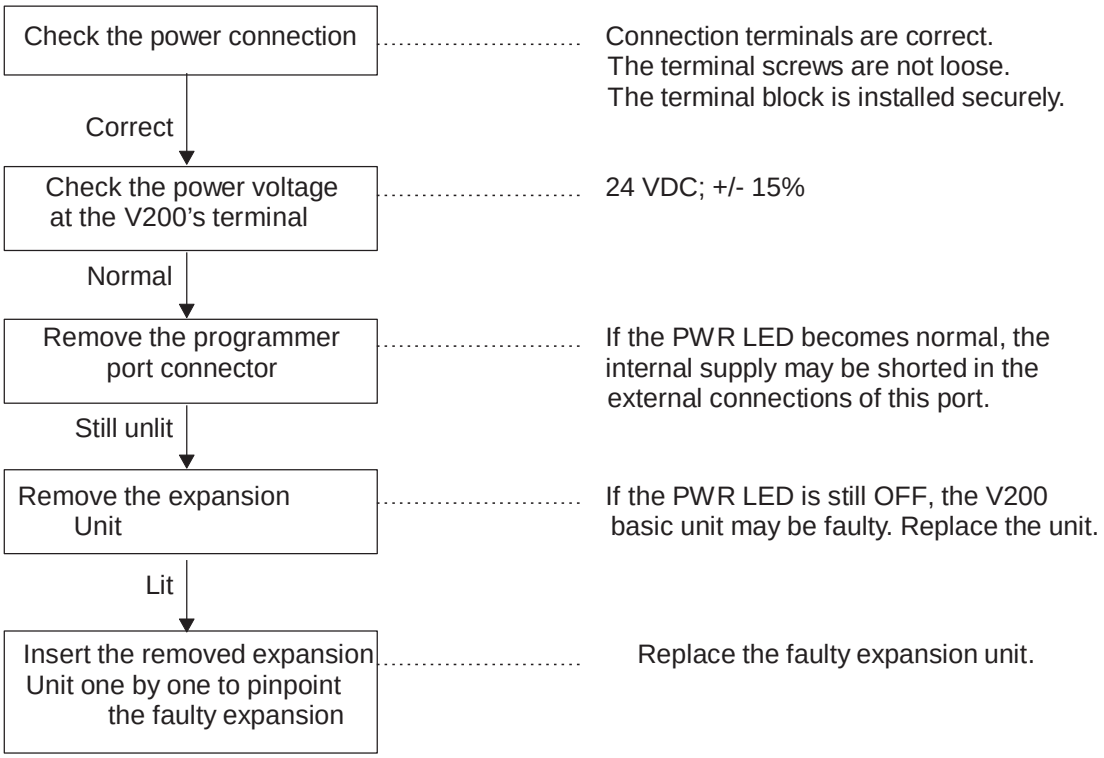
If trouble occurs, determine whether the cause lies in the mechanical side or in the control system (PLC) side. A problem may cause a secondary problem, therefore, try to determine the cause of trouble by considering the whole system.

If the problem is found in the PLC CPU model, check the following points:



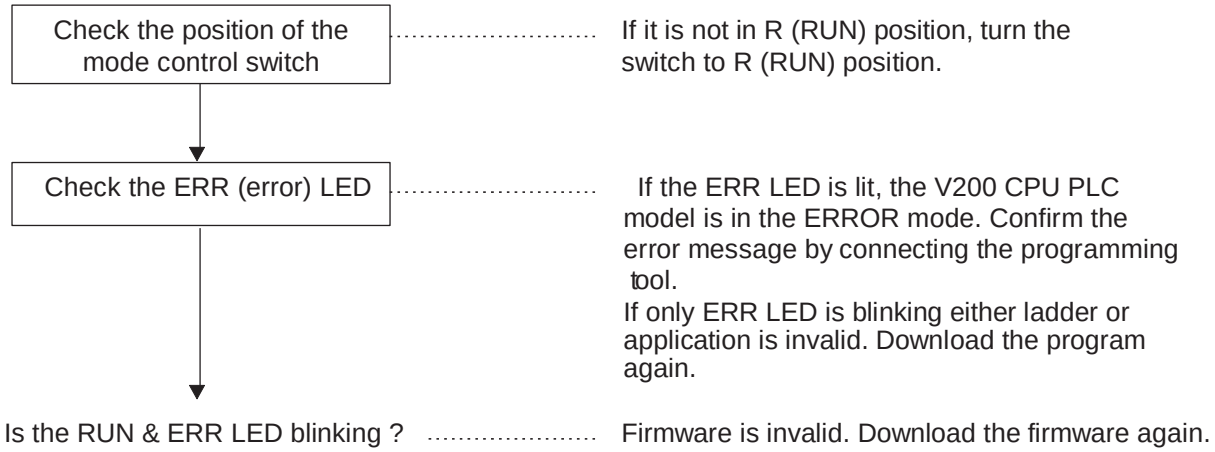
8.1.1 Power Supply Check

If the PWR (power) LED is not lit after power on, check the following points.



8.1.2 CPU Check

If the RUN LED is not lit after power on, check the following points.



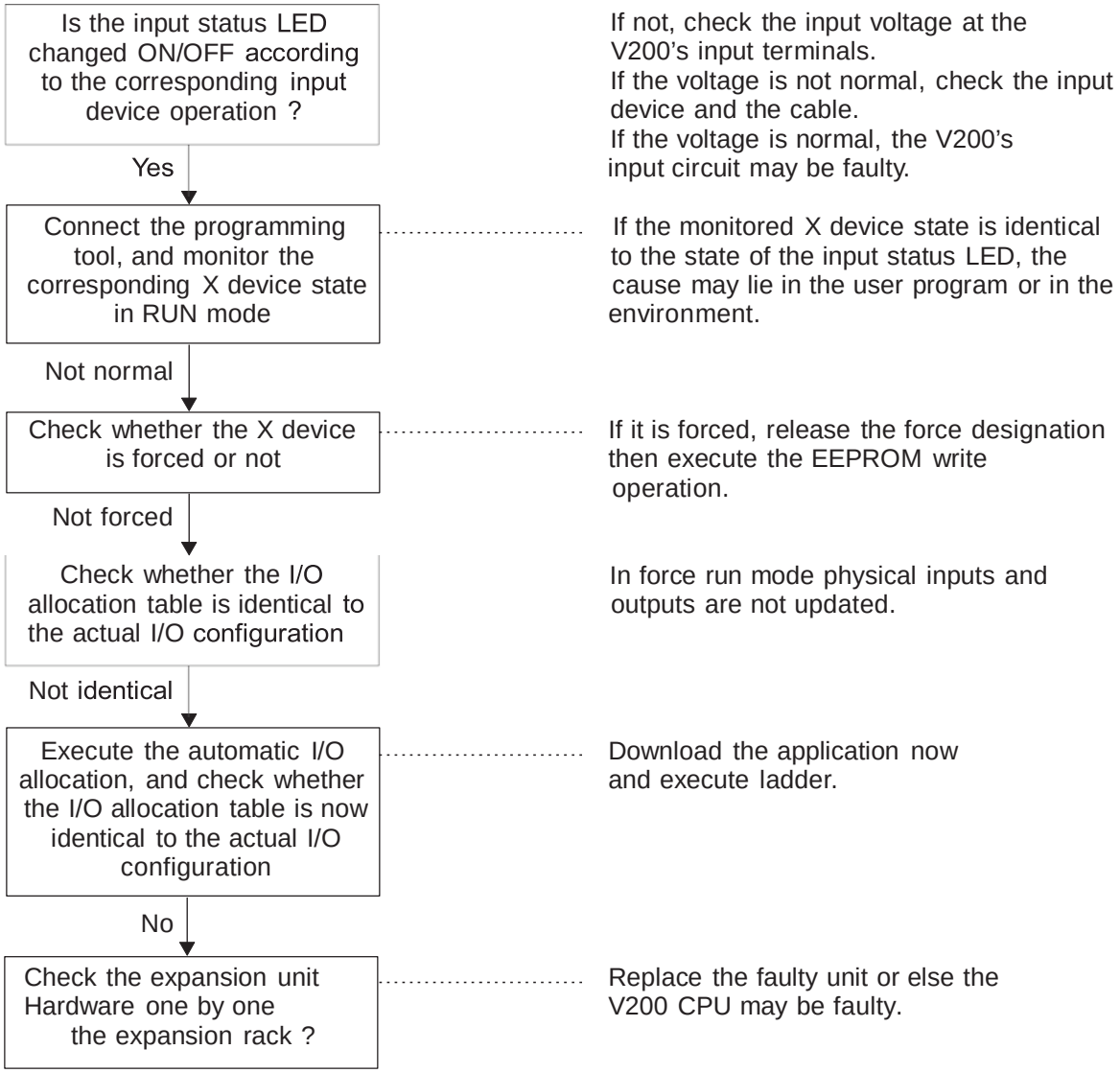
8.1.3 Program Check

Check the user program based on the following points if it is running but the operation does not work as intended.

1. Whether duplicated coils are not programmed.
2. Whether a coil device and a destination of a function instruction are not overlapping.
3. Whether the ON/OFF duration of an external input signal is not shorter than the unit's scan time.
4. Whether a register/device which is used in the main program is not operated erroneously in the interrupt program.

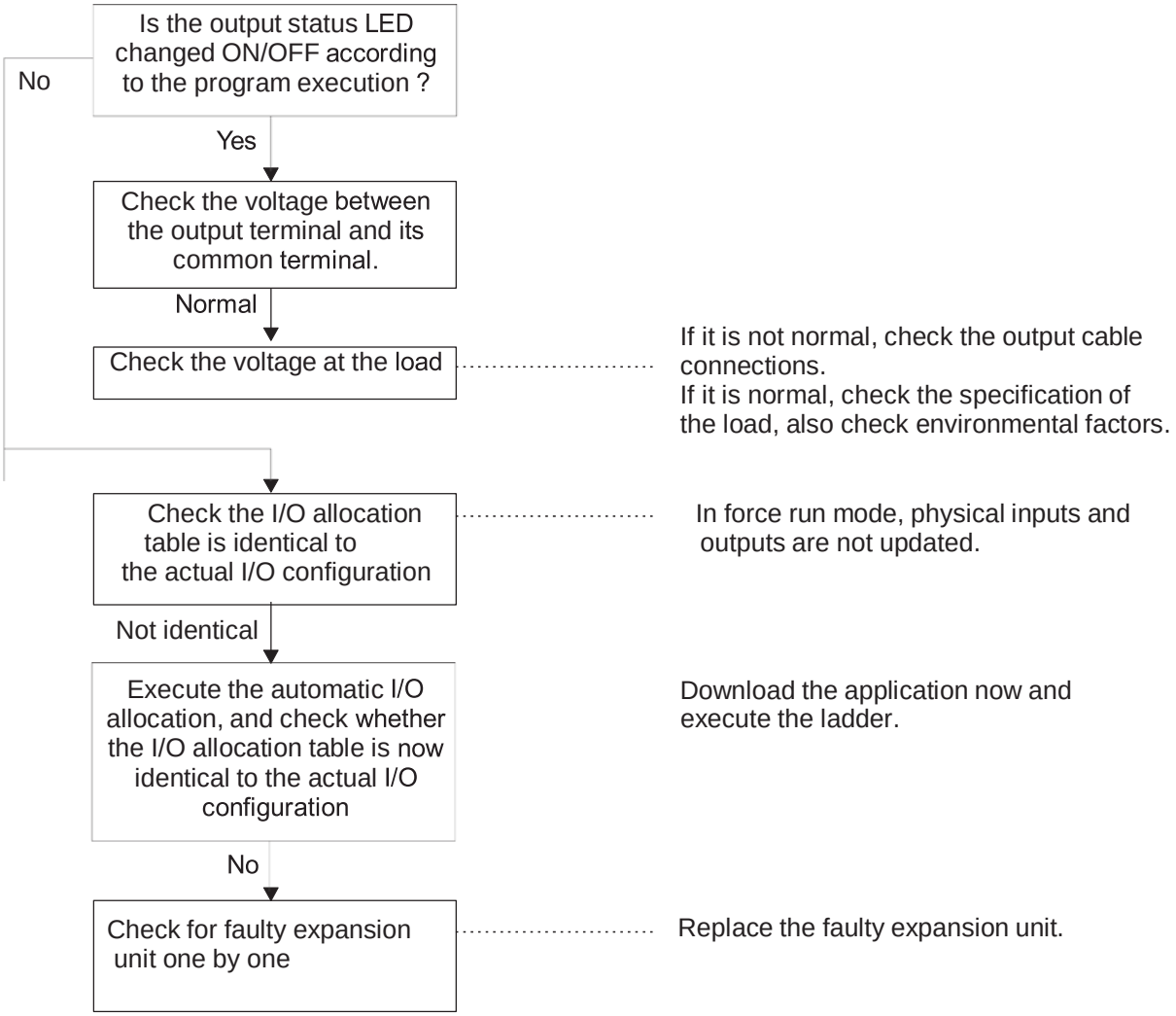
8.1.4 Input Check

If the program is running but the external input signal is not read normally, check the following points:



8.1.5 Output Check

If the output status monitored on the programming tool is normal but the external output device (load) is not operated normally, check the following points:



8.1.6 Environmental Problem

If the following improper operations occur in the controlled system, check possible environmental factors.

(1) If an improper operation occurs synchronously with the operation of I/O devices:
The noise generated at ON/OFF of the output device (load) may be the cause of the problem. Take necessary measures mentioned in section Precaution.

(2) If an improper operation occurs synchronously with the operation of surrounding equipment or high-frequency equipment:
The noise induced in I/O signal lines may be the cause of the problem. The surge voltage, voltage fluctuations, or differences of grounding potentials may cause the problem, depending on the power supply system or the grounding system. Check the operation in accordance with the precautions as maintained. For some cases, isolation from the ground may lead to the stable operation.

(3) If an improper operation occurs synchronously with the operation of machinery:
The vibration of the equipment may cause the problem. Check that the installation status of the units and take necessary measures.

(4) If a similar failure is repeated after the unit is replaced:
Check that no metal debris or water drops has been entered into the unit/module. Apart from the above points, consider climatic conditions. If the ambient temperature is beyond the specified range, stable operation of the system is not guaranteed.

8.2 Self Diagnostics

ERROR Mode :-
The ERROR mode is a shut-down mode as a result of self-diagnosis. The PLC enters the ERROR mode if internal trouble is detected by self-diagnosis. In this mode, program execution is stopped and all outputs are switched off. The cause of the Error-down can be confirmed by connecting to OIL-DS software. To exit from the ERROR mode, execute the Error Reset command from the OIL-DS, or cycle power OFF and then ON again.

Self-Diagnosis :-
Checks the proper operation of the PLC itself. If an error has detected and cannot be recovered by re-tries, the V200 moves into ERROR mode.
Self-Diagnosis is performed in firmware at two stages:
A) At initialization (Power ON)
e.g. RAM, ROM check, IO mismatch check.
B) In continuous while loop
e.g. IO bcc check, scan time check.

If an error is detected by the self-diagnostic check of the PLC, the error messages and related information shown on the following pages will be recorded in the PLC event history table. If the error is severe and continuation of operation is not possible, the PLC turns OFF all outputs and stops the operation (ERROR mode).

The latest 30 error messages are stored in the event history table. This event history table can be displayed on the OIL-DS. (Power ON/OFF is also registered) If the PLC has entered into ERROR mode, connect the OIL-DS to the PLC to confirm the error message in the event history table. This information is important to recover from an error.

In the event history table, No.1 message indicates the latest event recorded. Each column shows the following information:

Date: The date when the error has detected
Time: The time when the error has detected
Event: Error message
Count: Number of times the error has detected by retry action
Info n: Related information to the error detected
Mode: PLC operation mode in which the error has detected (INIT. means the power-up initialization)
Down: Shows the PLC has entered into ERROR mode by the error detected

If the PLC is in the ERROR mode, operations to correct the program are not accepted.
In this case, execute the Error reset operation by the OIL-DS to return the HALT mode before starting the correction operation.

Configuration registers (MW01 and MW02):

(1) These configuration devices are set by the PLC operating system. These devices are read only for user.
(2) Devices marked as (down) are set in the ERROR mode. These type of errors will cause the PLC to enter in the Error mode.
(3) Devices marked as (alarm) are set when the corresponding condition has occurred. PLC continues to be in the same mode if these errors occurs.

The errors in the PLC can be categorized as below:

1. **CPU error**:
   a. System watchdog Reset (WDT Error)
   If there is error in this category the CPU error flag (MW01_0 device) sets along with corresponding device of the error. So for WDT error MW01_11 device sets.

2. **I/O Error**:
   a. I/O mismatch error
   b. I/O bcc error.
   If there is error in this category the I/O error flag (MW01_1 device) sets along with corresponding device of the error. So for I/O mismatch error MW01_13 device sets and for I/O bcc error MW01_15 device sets.

3. **Program Error**:
   a. Scan Time Over error
   If there is error in this category the I/O error flag (MW01_2 device) sets along with corresponding device of the error. So for Scan Time Over error MW02_1 device.

4. **Other Errors**:
   a. Clock calendar error
   b. Retentive Data Loss error
   For Clock calendar error MW01_5 device sets and for Retentive Data Loss error MW01_6 device sets

Above error conditions are checked either in each main loop scan or only at power up. This is mentioned in the following table.
The configuration devices (M) and configuration registers (MW) are used for special purposes.

Error Messages and related information:

No.	Event	Info1	Info 2	Info 3	Info 4	Special Device	Meaning and countermeasures	Check at
1	Retentive Data Loss Error					MW01_6	In the power-up initialization, data invalidity of RAM (back-up area) has been detected. If retentive registers are used, these validity are not guarant-eed. (No error down)	Only Power-On
2	Clock-cal-endar error					MW01_5	The data of built-in calendar LSI is illegal.(No error down) Set the date and time.	Only Power-On
4	I/O mismatch	slot No.	Unit Type			MW01_1 MW01_13	The I/O allocation information and the actual I/O configuration are not identical.(Error down) Check the I/O allocation and the option card mounting status	Only Power-On
5	I/O BCC error		Unit No.	Register No.		MW01_1 MW01_15	I/O bus parity error has been detected in data read/write for I/O modules. An abnormality has been detected in I/O bus checking. (Error down)I/O No answer. (Error down) Check the expansion cable connect-ion and the I/O module mounting status.	Each main loop scan

No.	Event	Info1	Info 2	Info 3	Info 4	Special Device	Meaning and countermeasures	Check at
6	Scan time over	Scan time				MW01_2 MW02_1	The scan time has exceeded 200 mS (Default). (Alarm)Correct the program to reduce the scan time or use WDT instruction to extend the check time.	Each main loop scan
7	System power off						Power OFF (no error)	Only Power-Up
8	System power on						Power ON (no error)	Only Power-Up
9	WDT Error					MW01_00 MW01_11	The watchdog timer error has occurred.(Error down) If the error occurs frequently, replace the unit.	Only Power-Up

No	Device/register	Name	Function
1	MW01_0	CPU error (down)	ON at error state
2	MW01_1	I/O error	ON at error state
3	MW01_2	Program error Clock/calendar	ON at error state
4	MW01_5	error(alarm) Retentive data	ON when clock/calendar data is illegal
5	MW01_6	loss/invalid(alarm) System	ON when retentive data in RAM are invalid
6	MW01_11	Watchdog error (down) I/O	ON at error state
7	MW01_13	mismatch (down)	ON at error state
8	MW01_14	Analog Power Fail I/O	ON at error state
9	MW01_15	BCC error (down)	ON at error state
10	MW02_1	Scan time over (alarm)	ON when the scan time exceeds 200 ms

ROM Errors:

If the PLC does not have a program (Firmware / Application / Ladder) it remains in the wait loop as given in the Flow Chart. The LEDs are used to indicate these conditions. These errors are not logged in the event history.

No	Condition	Indication
1	No Firmware or Firmware corrupted.	RUN LED and ERR LED blinks at one second interval simultaneously.
2	No Application or Application corrupted.	ERR LED blinks at one second interval.
3	No Ladder or Ladder corrupted.	ERR LED blinks at one second interval.

Diagnosis Registers for Serial and Ethernet Communication channels:

Following system registers and system coils can be used for the control and diagnosis of communication channels:

Register / Coil	Tag Name	Read / Write	Description
SW0003_14	COM1 Status	Read only	0 = Communication Error 1= Communicating with Master
SW0003_15	COM2 Status	Read only	0 = Communication Error 1= Communicating with Master
SW0003_13	COM3 Status	Read only	0 = Communication Error 1= Communicating with Master
SW0018	COM1 failed node reconnect time (Sec)	Read/write	Shows time in sec recover the communication with failed nodes for port1.the default value is 60Sec
SW0019	COM2 failed node reconnect time (Sec)	Read/write	Shows time in sec recover the communication with failed nodes for port1.the default value is 60Sec
SW0022	COM3 failed node reconnect time (Sec)	Read/Write	Shows time in sec recover the communication with failed nodes for port3.the default value is 60Sec
S0021	COM1 failed node reconnect control	Read/write	If this bit is set communication with the failed nodes is detected after scan time SW0018 for port1.By default : ON

Register / Coil	Tag Name	Read / Write	Description
S0022	COM2 failed node reconnect control	Read/write	If this bit is set communication with the failed nodes is detected after scan time SW0019 for port2.By default : ON
S0023	COM3 failed node reconnect control	Read/write	If this bit is set communication with the failed nodes is detected after scan time SW0022 for port3. By default : ON
SW64-S65	Node Status Registers for COM1	Read only	Shows the status of the node, whether node is present or not. Total 2 word Register are mapped for 32 nodes.
SW66-S79	Node Status Registers for COM1	Read only	Shows the status of the node, whether node is present or not. Total 14 word Register are mapped for 224 nodes.
SW80-S81	Node Status Registers for COM2	Read only	Shows the status of the node, whether node is present or not. Total 2 word Register are mapped for 32 nodes.
SW82-S95	Node Status Registers for COM2	Read only	Shows the status of the node, whether node is present or not. Total 14 word Register are mapped for 224 nodes.
SW96-S111	Node Status Registers for COM3	Read only	Shows the status of the node, whether node is present or not. Total 16 word Register are mapped for 256 nodes.

MAINTENANCE AND CHECKS

9.1 Precautions During Operation

When the V200 is in operation, you should pay attention to the following points:

(1) The programming cable can be plugged or unplugged while the V200 is in operation. When you try to do it, do not touch the connector pins. This may cause malfunction of the V200 owing to static electricity.

(2) Do not plug nor unplug the expansion cable during power on. This can cause damage to the equipment. Furthermore, to avoid malfunction of the V200 owing to static electricity, do not touch the cable ends.

(3) Do not touch any terminals while the V200 when it is in operation, even if the terminals are not live parts. This may cause malfunction of the V200 owing to static electricity.

(4) Do not touch the expansion connector pins while the V200 CPU model is in operation. This may cause malfunction of the units owing to static electricity.
Fix the expansion connector cover if the expansion connector is not used.

(5) Do not insert your finger into the option card slot while theV200 is in operation. This may cause malfunction of the V200 owing to static electricity.
Fix the option card slot cover securely.

(6) Do not insert your finger into the expansion rack's ventilation hole during power on. This may cause malfunction of the V200 owing to static electricity.

9.2 Daily Checks

CAUTION

1. Pay special attention during the maintenance work to minimize the risk of electrical shock.

2. Turn off power immediately if the V200 CPU or related equipment is emitting smoke or burning. Operation under such situation can cause fire or electrical shock.

To maintain the system and to prevent troubles, check the following items on daily basis.

Item	Check		Corrective measures
Status LEDs	PWR (power)	Lit when internal 3.3 V is normal.	If the LEDs are not normal, see Troubleshooting.
	RUN	Lit when operating normally.	
	FLT (fault)	Not lit when operating normally.	
Mode control switch	Check that the mode control switch is in R (RUN) side. Normal operation is performed when this switch is in R (RUN) side.		Turn this switch to R (RUN) side.
Input LEDs	Lit when the corresponding input is ON.		• Check that the input terminal screw is not loose. • Check that the input terminal block is not loose. • Check that the input voltage is within the specified range.
Output LEDs	Lit when the output is ON and the corresponding load should operate.		• Check that the output terminal screw is not loose. • Check that the output terminal block is not loose. • Check that the output voltage is within the specified range.

9.3 Periodic Checks

CAUTION

1. Pay special attention during the maintenance work to minimize the risk of electrical shock.

2. Turn off power immediately if the V200 or related equipment is emitting smoke or odor. Operation under such situation can cause fire or electrical shock.

Check the V200 are based on the following items every six months. Also perform checks when the operating environment is changed.

Item	Check	Criteria
Power supply	Measure the power voltage at the unit's power terminals.	85 - 132/170 - 264 Vac (AC PS) 20.4 - 28.8 Vdc (DC PS)
	Check that the terminal screw is not loose.	Not loose
	Check that the power cable is not damaged.	Not damaged
Installation condition	Check that the unit is installed securely.	Not loose
	Check that the option card is inserted securely. (if any)	Not loose
	Check that the expansion rack/unit is installed securely. (if any)	Not loose
	Check that the expansion cable is connected securely and the cable is not damaged. (if any)	Not loose, not damaged
	Check that the I/O module on the expansion rack is inserted securely. (if any)	Not loose
Input/output	Measure the input/output voltage at the unit's terminals.	The voltage must be within the specified range.
	Check the input status LEDs.	The LED must light normally.
	Check the output status LEDs.	The LED must light normally.
	Check that the terminal block is installed securely.	Not loose, no play
	Check that the terminal screw is not loose and the terminal has a sufficient distance to the next terminal.	Not loose, not contacting the next terminal
	Check that the each I/O wire is not damaged.	Not damaged
Environment	Check that the temperature, humidity, vibration, dust, etc. are within the specified range.	Must be within the range of general specification.

Item	Check	Criteria
Programming tool	Check that the functions of the programming tool are normal.	Monitoring and other operations are available.
	Check that the connector and cable are not damaged.	Not damaged
User program	Check that the T1/T1S program and the master program (saved on a floppy disk, etc.) are the same.	No compare error

9.4 Spare Parts

To recover from trouble quickly, it is recommended to keep the following spare parts:

Item	Quantity	Remarks
V200 CPU	1	Maintain at least one to minimize down-time of the controlled system.
Programming tool	1	Useful for troubleshooting.
Master program	As required	Saved on a CD, USB drive, etc.
Expansion rack or unit (if needed)	1	
I/O modules	One of each type used	

These spare parts should not be stored in high temperature locations and/or locations with high humidity.

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